MULTIPLE CHOICE QUESTIONS IN

ENGINEERING MATHEMATICS BY BESAVILLA

Encoded by:
Dizon, Brent Marion C.
Villanueva, Reyaneil R.

ECE003-C12

1. Evaluate the lim (x^2-16)/(x-4).
   a. 1
   b. 8
   c. 0
   d. 16

2. Evaluate the limit (x-4)/(x^2-x-12) as x approaches 4.
   a. undefined
   b. 0
   c. infinity
   d. 1/7

3. What is the limit of cos (1/y) as y approaches infinity?
   a. 0
   b. -1
   c. infinity
   d. 1

4. Evaluate the limits of lim (x^3-2x+9) /(2x^3-8).
   a. 0
   b. -9/8
   c. α
   d. ½

5. Evaluate the limit of (x^3-2x^2-x+2) /(x^2-4) as x approaches 2.
   a. α
   b. ¾
   c. 2/5
   d. 4/7

6. Evaluate the limit of √(x-4)/√(x^2-16) as x approaches 4.
   a. 0.262
   b. 0.354
   c. 0
   d. α

7. Evaluate the limit of (x^2-x-6)/(x^2-4x+3) as x approaches 3.
   a. 3/2
   b. 3/5
   c. 0
   d. 5/2

8. Evaluate the limit of (4x^2-x)/ (2x^2+4) as x approaches α.
   a. 2
   b. 4
   c. α

d. 0

9. Evaluate the limit of (x-2)/(x^3-8) as x approaches 2.
   a. α
   b. 1/12
   c. 0
   d. 2/3

10. Evaluate the limit of θ/(2 sinθ) as θ approaches 0.
   a. 2
   b. ½
   c. 0
   d. α

11. Evaluate the limit of (1-sec^2 (x)/ cos (x)-1 as x approaches 0.
   a. -2
   b. α
   c. 0
   d. 1

12. Evaluate the limit (x^3-27)/(x-3) as x approaches to 3.
   a. 0
   b. infinity
   c. 9
   d. 27

13. Evaluate the limit (3x^3-4x^2-5x+2)/ (x^2-x-2) as x approaches to 2.
   a. α
   b. 5
   c. 0
   d. 7/3

14. Evaluate the limit of (4 tan^3 (x)/ 2sin(x)-x as x approaches 0.
   a. 1
   b. 0
   c. 2
   d. α

15. Evaluate the limit of 8x/(2x-1) as x approaches α.
   a. 4
   b. 3
   c. 2
   d. -1

16. Evaluate the limit of (x^2-1)/ (x^2+3x-4) as x approaches 1.

a. 2/5
b. 1/5
c. 3/5
d. 4/5

17. Evaluate the limit of (x+2)/(x-2) as x approaches α.
a. α
b. -1
c. 1
d. 4

18. Evaluate the limit of (1-cosx)/(x^2) as x approaches 0.
a. α
b. ½
c. 1
d. 0

19. Find the limit of [sqrt(x+4)-2]/x as x approaches 0.
a. α
b. ¼
c. 0
d. ½

20. Find the limit [sqrt(x+9)-3]/x as x approaches 0.
a. α
b. 1/6
c. 0
d. 1/3

21. Evaluate the limit (x^2+x-6)/(x^2-4) as x approaches to 2.
a. 6/5
b. 5/4
c. 4/3
d. 3/2

22. Evaluate the limit (x^4-81)/(x-3) as x approaches to 3.
a. 108
b. 110
c. 122
d. 100

23. Evaluate the limit (x+sin2x)/
(x-sin2x) as x approaches to 0.
a. -5
b. -3
c. 4

d. -1

24. Evaluate the limit (ln sin x)/(ln tan x) as x approaches to 0.

a. 1
b. 2
c. ½
d. α

25. Compute the equation of the vertical asymptote of the curve y=(2x-1)/(x+2).

a. x+2=0
b. x-3=0
c. x+3=0
d. x-2=0

26. Compute the equation of the horizontal asymptote of the curve y=(2x-1)/(x+2).

a. y=2
b. y=0
c. y-1=0
d. y-3=0

27. The function y=(x-4)/(x+2) is discontinuous at x equals?

a. -2
b. 0
c. 1
d. 2

28. An elliptical plot of garden has a semi-major axis of 6m and a semi-minor axis of 4.8meters. If these are increased by 0.15m each, find by differential equations the increase in area of the garden in sq.m.

a. 0.62π
b. 1.62π
c. 2.62π
d. 2.62π

29. The diameter of a circle is to be measured and its area computed. If the diameter can be measured with a maximum error of 0.001cm and the area must be accurate to within 0.10sq.cm. Find the largest diameter for which the process can be used.

a. 64
b. 16
c. 32
d. 48

30. The altitude of a right circular cylinder is twice the radius of the base. The altitude is measured as 12cm. With a possible error of 0.005cm, find the approximately error in the calculated volume of the cylinder.

a. 0.188 cu cm

b. 0.144 cu cm
c. 0.104 cu cm
d. 0.126 cu cm

31. What is the allowable error in measuring the edge of a cube that is intended to hold a cu m, if the error in the computed volume is not to exceed 0.03 cu m?
a. 0.002
b. 0.0025
c. 0.003
d. 0.001

32. If y=x^(3/2) what is the approximate change in y when x changes from 9 to 9.01?
a. 0.045
b. 0.068
c. 0.070
d. 0.023

33. The expression for the horsepower of an engine is P=0.4 n x^2 where n is the number of cylinders and x is the bore of cylinders. Determine the power differential added when four cylinder car has the cylinders rebored from 3.25cm to 3.265cm.
a. 0.156 hp
b. 0.210 hp
c. 0.319 hp
d. 0.180 hp

34. A surveying instrument is placed at a point 180m from the base of a bldg on a level ground. The angle of elevation of the top of a bldg is 30 degrees as measured by the instrument. What would be error in the height of the bldg due to an error of 15minutes in this measured angle by differential equation?
a. 1.05m
b. 1.09m
c. 2.08m
d. 1.05m

35. If y=3x^2-x+1, find the point x at which dy/dx assume its mean value in the interval x=2 and x=4.
a. 3
b. 6
c. 4
d. 8

36. Find the approximate increase by the use of differentials, in the volume of the sphere if the radius increases from 2 to 2.05.
a. 2.51
b. 2.25
c. 2.12

d. 2.86

37. If the area of a circle is 64π sq mm, compute the allowable error in the area of a circle if the allowable error in the radius is 0.02 mm.

a. 1.01 sq mm
b. 1.58 sq mm
c. 2.32 sq mm
d. 0.75 sq mm

38. If the volume of a sphere is 1000π/6 cu mm and the allowable error in the diameter of the sphere is 0.03 mm, compute the allowable error in the volume of a sphere.

a. 6.72 cu mm
b. 4.71 cu mm
c. 5.53 cu mm
d. 3.68 cu mm

39. A cube has a volume of 1728 cu mm. If the allowable error in the edge of a cube is 0.04 mm, compute the allowable error in the volume of the cube.

a. 17.28 cu mm
b. 16.88 cu mm
c. 15.22 cu mm
d. 20.59 cu mm

40. Find the derivative of y=2^(4x).

a. 3^(4x+2) ln 2
b. 2^(4x+2) ln 2
c. 6^(3x+2) ln 2
d. 4^(4x+2) ln 2

41. Find the derivative of h with respect to u if h=π^(2u).

a. π^(2u)
b. 2u ln π
c. 2π^(2u) ln π
d. 2π^(2u)

42. Find y' if y=ln x

a. 1/x
b. ln x^2
c. 1/ln x
d. x ln x

43. Find y' if y=arc sin (x)

a. √(1-x^2)
b. 1/√(1-x^2)
c. 1/(1+x^2)
d. (1+x)/√(1-x^2)

44. Find the derivative of $\log_a u$ with respect to x.
   a. log u du/dx
   b. u du/ln a
   c. $\log_a e/u$
   d. log a du/dx

45. Find the derivative of arc cos (2x).
   a. -2/√(1-4x^2)
   b. 2/√(1-4x^2)
   c. 2/(1+4x^2)
   d. 2/√(2x^2-1)

46. Find the derivative of 4 arc tan (2x).
   a. 4/(1+x^2)
   b. 4/(4x^2+1)
   c. 8/(1+4x^2)
   d. 8/(4x^2+1)

47. Find the derivative of arc csc (3x).
   a. -1/[x√(9x^2-1)]
   b. 1/[3x√(9x^2-1)]
   c. 3/[x√(1-9x^2)]
   d. 3/[x√9x^2-1)]

48. Find the derivative of arc sec (2x)
   a. 1/[x√(4x^2-1)]
   b. 2/[x√(4x^2-1)]
   c. 1/[x√(1-4x^2)]
   d. 2/[x√(1-4x^2)]

49. If ln (ln y) + ln y = ln x, find y'.
   a. x/(x+y)
   b. x/(x-y)
   c. y/(x+y)
   d. y/(x-y)

50. Find y" if y=a^u.
   a. a^u ln a
   b. u ln a
   c. a^u/ln a
   d. a ln u

51. Find the derivative of y with respect to x if y = x ln x – x.
   a. x ln x
   b. ln x
   c. (ln x)/x

d. x/ln x

52. If y=tanh x, find dy/dx.

a. sech^2 (x)
b. csch^2 (x)
c. sinh^2 (x)
d. tanh^2 (x)

53. Find the derivative of y=x^x.

a. x^x (2+ln x)
b. x^x (1+ln x)
c. x^x (4-ln x)
d. x^x (8+ln x)

54. Find the derivative of y=$\log_a$ 4x.

a. y'=($\log_a$ e)/x
b. y'=(cos e)/x
c. y'=(sin e)/x
d. y'=(tan e)/x

55. What is the derivative with respect to x of (x+1)^3 – x^3.

a. 3x+3
b. 3x-3
c. 6x-3
d. 6x+3

56. What is the derivative with respect to x of sec^2 (x)?

a. 2x sec^2 (x) tan^2 (x)
b. 2x sec (x) tan (x)
c. sec^2 (x) tan^2 (x)
d. 2 sec^2 (x) tan^2 (x)

57. The derivative with respect to x of
2cos^2 (x^2+2).

a. 4 sin (x^2+2) cos (x^2+2)
b. -4 sin (x^2+2) cos (x^2+2)
c. 8x sin (x^2+2) cos (x^2+2)
d. -8x sin (x^2+2) cos (x^2+2)

58. Find the derivative of [(x+1)^3]/x.

a. [3(x+1)^2]/x – [(x+1)^3]/x^2
b. [2(x+1)^3]/x – [(x+1)^3]/x^3
c. [4(x+1)^2]/x – [2(x+1)^3]/x
d. [(x+1)^2]/x – [(x+1)^3]/x

59. Determine the slope of the curve y=x^2-3x as it passes through the origin.

a. -4
b. 2
c. -3
d. 0

60. If y1=2x+4 and y2=x^2+C, find the value of C such that y2 is tangent to y1.
a. 6
b. 5
c. 7
d. 4

61. Find the slope of (x^2)y=8 at the point (2,2).
a. 2
b. -1
c. -1/2
d. -2

62. What is the first derivative dy/dx of the expression (xy)^x=e.
a. –y(1-ln xy)/x^2
b. –y(1+ln xy)/x
c. 0
d. x/y

63. Find y' in the following equation y=4x^2-3x-1.
a. 8x-3
b. 4x-3
c. 2x-3
d. 8x-x

64. Differentiate the equation y=(x^2)/(x+1).
a. (x^2+2x)/(x+1)^2
b. x/(x+1)
c. 2x^2/(x+1)
d. 1

65. If y=x/(x+1), find y'.
a. 1/(x+1)^3
b. 1/(x+1)^2
c. x+1
d. (x+1)^2

66. Find dy/dx in the equation y=(x^6+3x^2+50)/(x^2+1) if x=1
a. -21
b. -18
c. 10
d. 16

67. Find the equation of the curve whose slope is (x+1)(x+2) and passes through point (-3, -3/2).

a. y=x^2+2x-4
b. y=(x^3)/3+(3x^2)/2+2x
c. y= 3x^2+4x-8
d. y=(3x^2)/2+4x/3+2

68. Find the equation of the curve whose slope is 3x^4-x^2 and passes through point (0,1).

a. y=(3x^5)/5-(x^3)/3+1
b. y=(x^4)/4-(x^3)+1
c. y=(2x^5)/5-2x+1
d. y=(3x^5)-(x^3)/3+1

69. What is the slope of the tangent to y=(x^2+1)(x^3-4x) at (1,-6)?

a. -8
b. -4
c. 3
d. 5

70. Find the coordinate of the vertex of the parabola y=x^2-4x+1 by making use of the fact that at the vertex, the slope of the tangent is zero.

a. (2,-3)
b. (3,2)
c. (-1,-3)
d. (-2,-3)

71. Find the slope of the curve
x^2+y^2-6x+10y+5=0 at point (1,0).

a. 2/5
b. ¼
c. 2
d. 2

72. Find the slope of the ellipse x^2+4y^2-10x+16y+5=0 at the point where y=2+8^0.5 and x=7.

a. -0.1654
b. -0.1538
c. -0.1768
d. -0.1463

73. Find the slope of the tangent to the curve y=2x-x^2+x^3 at (0,2).

a. 2
b. 3
c. 4

d. 1

74. Find the equation of the tangent to the curve y=2e^x at (0,2).
a. 2x-y+3=0
b. 2x-y+2=0
c. 3x+y+2=0
d. 2x+3y+2=0

75. Find the slope of the curve y=2(1+3x)^2 at point (0,3).
a. 12
b. -9
c. 8
d. -16

76. Find the slope of the curve y=x^2(x+2)^3 at point (1,2).
a. 81
b. 48
c. 64
d. 54

77. Find the slope of the curve
y=[(4-x)^2]/x at point (2,2).
a. -3
b. 2
c. -2
d. 3

78. If the slope of the curve y^2=12x is equal to 1 at point (x,y), find the value of x and y.
a. x=3, y=6
b. x=4, y=5
c. x=2, y=7
d. x=5, y=6

79. If the slope of the curve x^2+y^2=25 is equal to -3/4 at point (x,y) find the value of x and y.
a. 3,4
b. 2,3
c. 3,4.2
d. 3.5,4

80. If the slope of the curve 25x^2+4y^2=100 is equal to -15/8 at point (x,y), find the value of x and y.
a. 1.2,4
b. 2,4
c. 1.2,3
d. 2,4.2

81. Determine the point on the curve x^3-9x-y=0 at which slope is 18.

a. x=3, y=0
b. x=4, y=5
c. x=2, y=7
d. x=5, y=6

82. Find the second derivative of y=(2x+1)^2+x^3.

a. 8+6x
b. (2x+1)^3
c. x+1
d. 6+4x

83. Find the second derivative of y=(2x+4)^2 x^3.

a. x^2(80x+192)
b. 2x+4
c. x^3(2x+80)
d. x^2(20x+60)

84. Find the second derivative of y=2x+3(4x+2)^3 when x=1.

a. 1728
b. 1642
c. 1541
d. 1832

85. Find the second derivative of y=2x/[3(4x+2)^2] when x=0.

a. -1.33
b. 1.44
c. 2.16
d. -2.72

86. Find the second derivative of y=3/(4x^-3) when x=1.

a. 4.5
b. -3.6
c. 2.4
d. -1.84

87. Find the second derivative of y=x^-2 when x=2.

a. 0.375
b. 0.268
c. 0.148
d. 0.425

88. Find the first derivative of y=2cos(2+x^2).

a. -4x sin (2+x^2)

b. $4x \cos(2+x^2)$
c. $x \sin(2+x^2)$
d. $x \cos(2+x^2)$

89. Find the first derivative of
$y=2 \sin^2(3x^2-3)$.

a. $24x \sin(3x^2-3) \cos(3x^2-3)$
b. $12 \sin(3x^2-3)$
c. $6x \cos(3x^2-3)$
d. $24x \sin(3x^2-3)$

90. Find the first derivative of $y=\tan^2(3x^2-4)$.

a. $12x\tan(3x^2-4)\sec^2(3x^2-4)$
b. $x \tan(3x^2-4)$
c. $\sec^2(3x^2-4)$
d. $2 \tan^2(3x^2-4)\csc^2(3x^2-4)$

91. Find the derivative of arc cos 4x

a. $-4/(1-16x^2)^{0.5}$
b. $4/(1-16x^2)^{0.5}$
c. $-4/(1-4x^2)^{0.5}$
d. $4/(1-4x^2)^{0.5}$

92. The equation $y^2=cx$ is the general equation of.

a. $y'=2y/x$
b. $y'=2x/y$
c. $y'=y/2x$
d. $y'=x/2y$

93. Find the slope of the curve $y=6(4+x)^{1/2}$ at point (0,12).

a. 1.5
b. 2.2
c. 1.8
d. 2.8

94. Find the coordinate of the vertex of the parabola $y=x^2-4x+1$ by making use of the fact that at the vertex, the slope of the tangent is zero.

a. (2,-3)
b. (3,2)
c. (-1,-3)
d. (-2,-3)

95. Find dy/dx by implicit differentiation at the point (3,4) when $x^2+y^2=25$.

a. -3/4
b. ¾
c. 2/3

d. -2/3

96. Find dy/dx by implicit differentiation at point (0,0) if (x^3)(y^3)-y=x.

a. -1
b. -2
c. 2
d. 1

97. Find dy/dx by implicit differentiation at point (0,-2) if x^3-xy+y^2=4.

a. ½
b. -2
c. -2/3
d. ¾

98. Find the point of inflection of f(x)=x^3-3x^2-x+7.

a. 1,4
b. 1,2
c. 2,1
d. 3,1

99. Find the point of inflection of the curve y=(9x^2-x^3+6)/6.

a. 3,10
b. 2,8
c. 3,8
d. 2,10

100. Find the point of inflection of the curve y=x^3-3x^2+6.

a. 1,4
b. 1,3
c. 0,2
d. 2,1

101. Locate the point of inflection of the curve y=f(x)=(x square)(e exponent x).

a. -2 plus or minus (sqrt of 3)
b. 2 plus or minus (sqrt of 2)
c. -2 plus or minus (sqrt of 2)
d. 2 plus or minus (sqrt of 3)

102. The daily sales in thousands of pesos of a product is given by S=(x^2-x^3+6)/6 where x is the thousand of pesos spent on advertising. Find the point of diminishing returns for money spent on advertising.

a. 5
b. 4
c. 3
d. 6

103. y=x to the 3^{rd} power -3x. Find the maximum value of y.

a. 2
b. 1
c. 0
d. 3

104. Find the curvature of the parabola y^2=12x at (3,6).

a. -√2/24
b. √2/8
c. 3√2
d. 8√2/3

105. Locate the center of curvature of the parabola x^2=4y at point (2,2).

a. (-2,6)
b. (-3,6)
c. (-2,4)
d. (-3,7)

106. Compute the radius of curvature of the parabola x^2=4y at the point (4,4).

a. 22.36
b. 24.94
c. 20.38
d. 18.42

107. Find the radius of curvature of the curve y=2x^3+3x^2 at (1,5).

a. 97
b. 90
c. 101
d. 87

108. Compute the radius of curvature of the curve x=2y^3-3y^2 at (4,2).

a. -97.15
b. -99.38
c. -95.11
d. -84.62

109. Find the radius of curvature of a parabola y^2-4x=0 at point (4,4).

a. 22.36
b. 25.78
c. 20.33
d. 15.42

110. Find the radius of curvature of the curve x=y^3 at point (1,1).

a. -1.76
b. -1.24
c. 2.19

d. 2.89

111. A cylindrical boiler is to have a volume of 1340 cu ft. The cost of the metal sheets to make the boiler should be minimum. What should be its diameter in feet?

a. 7.08
b. 11.95
c. 8.08
d. 10.95

112. A rectangular corral is to be built with a required area. If an existing fence is to be used as one of the sides, determine the relation of the width and the length which would cost the least.

a. width=twice the length
b. width=1/2 length
c. width=length
d. width=3 times the length

113. Find the two numbers whose sum is 20, if the product of one by the cube of the other is to be minimum.

a. 5 and 15
b. 10 and 10
c. 4 and 16
d. 8 and 12

114. The sum of two numbers is 12. Find the minimum value of the sum of their cubes.

a. 432
b. 644
c. 346
d. 244

115. A printed page must contain 60 sq m of printed material. There are to be margins of 5cm on either side and margins of 3cm on top and bottom. How long should the printed lines be in order to minimize the amount of paper used?

a. 10
b. 18
c. 12
d. 15

116. a school sponsored trip will cost each students 15 pesos if not more than 150 students make the trip, however the cost per student will reduced by 5 centavos for each student in excess of 150. How many students should make the trip in order for the school to receive the largest group income?

a. 225
b. 250
c. 200
d. 195

117. A rectangular box with square base and open at the top is to have a capacity of 16823 cu cm. Find the height of the box that requires minimum amount of materials required.

a. 16.14 cm
b. 14.12 cm
c. 12.13 cm
d. 10.36 cm

118. A closed cylindrical tank has a capacity of 576.56 cu m. Find the minimum surface area of the tank.

a. 383.40 cu m
b. 412.60 cu m
c. 516.32 cu m
d. 218.60 cu m

119. A wall 2.245 m high is x meters away from a building. The shortest ladder that can reach the building with one end resting on the ground outside the wall is 6m. What is the value of x?

a. 2m
b. 2.6m
c. 3.0m
d. 4.0m

120. With only 381.7 sq m of materials, a closed cylindrical tank of maximum volume is to be the height of the tank, in m?

a. 9m
b. 7m
c. 11m
d. 13m

121. If the hypotenuse of a right triangle is known, what is the ratio of the base and the altitude of the right triangle when its are is maximum?

a. 1:1
b. 1:2
c. 1:3
d. 1:4

122. The stiffness of a rectangular beam is proportional to the breadth and the cube of the depth. Find the shape of the stiffest beam that can be cut from a log of given size.

a. depth=√3 breadth
b. depth=breadth
c. depth=√2 breadth
d. depth=2√2 breadth

123. What is the maximum length of the perimeter if the hypotenuse of a right triangle is 5m long?

a. 12.08 m
b. 15.09 m
c. 20.09 m
d. 8.99 m

124. An open top rectangular tank with square s bases is to have a volume of 10 cu m. The material fir its bottom is to cost 15 cents per sq m and that for the sides 6 cents per sq m. Find the most economical dimensions for the tank.

a. 2 x 2 x 2.5
b. 2 x 5 x 2.5
c. 2 x 3 x 2.5
d. 2 x 4 x 2.5

125. A trapezoidal gutter is to be made from a strip of metal 22m wide by bending up the sides. If the base is 14m, what width across the top gives the greatest carrying capacity?

a. 16
b. 22
c. 10
d. 27

126. Divide the number 60 into two pats so that the product P of one part and the square of the other is maximum. Find the smallest part.

a. 20
b. 22
c. 10
d. 27

127. The edges of a rectangular box are to be reinforced with a narrow metal strips. If the box will have a volume of 8 cu m, what would its dimensions be to require the least total length of strips?

a. 2 x 2 x 2
b. 4 x 4 x 4
c. 3 x 3 x 3
d. 2 x 2 x 4

128. A rectangular window surmounted by a right isosceles triangle has a perimeter equal to 54.14m. Find the height of the rectangular window so that the window will admit the most light.

a. 10
b. 22
c. 12
d. 27

129. A normal window is in the shape of a rectangle surrounded by a semi-circle. If the perimeter of the window is 71.416, what is its radius and the height of the rectangular portion so that it will yield a window admitting the most light?

a. 10
b. 22
c. 12
d. 27

130. Find the radius of a right circular cone having a lateral area of 544.12 sq m to have a maximum volume.

a. 10
b. 20
c. 17
d. 19

131. A gutter with trapezoidal cross section is to be made from a long sheet of tin that is 15cm wide by turning up one third of its width on each side. What width across the top that will give a maximum capacity?

a. 10
b. 20
c. 15
d. 13

132. A piece of plywood for a billboard has an area of 24 sq ft. The margins at the top and bottom are 9 inches and at the sides are 6 in. Determine the size of plywood for maximum dimensions of the painted area.

a. 4 x 6
b. 3 x 4
c. 4 x 8
d. 3 x 8

133. A manufacturer estimates that the cost of production of x units of a certain item is C=40x-0.02x^2-600. How many units should be produced for minimum cost?

a. 1000 units
b. 100 units
c. 10 units
d. 10000 units

134. If the sum of the two numbers is 4, find the minimum value of the um of their cubes.

a. 16
b. 18
c. 10
d. 32

135. If x units of a certain item are manufactured, each unit can be sold for 200-0.01x pesos. How many units can be manufactured for maximum revenue? What is the corresponding unit price?

a. 10000, P100
b. 10500, P300
c. 20000, P200
d. 15000, P400

136. A certain spare parts has a selling price of P150 if they would sell 8000 units per month. If for every P1.00 increase in selling price, 80 units less will be sold out pr month. If the production cost is P100 per unit, find the price per unit for maximum profit per month.

a. P175
b. P250
c. P150
d. P225

137. The highway department is planning to build a picnic area for motorist along a major highway. It is to be rectangular with an area of 5000 sq m is to be fenced off on the three sides not adjacent to the highway. What is the least amount of fencing that ill be needed to complete the job?

a. 200m
b. 300m
c. 400m
d. 500m

138. A rectangular lot has an area of 1600 sq m. Find the least amount of fence that could be used to enclose the area.

a. 160m
b. 200m
c. 100m
d. 300m

139. A student club on a college campus charges annual membership due of P10, less 5 centavos for each member over 60. How many members would give the club the most revenue from annual dues?

a. 130 members
b. 420 members
c. 240 members
d. 650 members

140. A company estimates that it can sell 1000 units per weak if it sets the unit price at P3.00, but that its weekly sles will rise by 100 units for each P0.10 decrease in price. Find the number of units sold each week and its unit price per max revenue.

a. 2000, P2.00
b. 1000, P3.00

c. 2500, P2.50
d. 1500, P1.50

141. In manufacturing and selling x units of a certain commodity, the selling price per unit is P=5-0.002x and the production cost in pesos is C=3+1.10x. Determine the production level that will produce the max profit and what would this profit be?

a. 975, P1898.25
b. 800, P1750.75
c. 865, P1670.50
d. 785, P1920.60

142. ABC company manufactures computer spare parts. With its present machines, it has an output of 500 units annually. With the addition of the new machines the company could boosts its yearly production to 750 units. If it produces x parts it can set a price of P=200-0.15x pesos per unit and will have a total yearly cost of C=6000+6x-0.003x in pesos. What production level maximizes total yearly profit?

a. 660 units
b. 237 units
c. 560 units
d. 243 units

143. The fixed monthly cost for operating a manufacturing plant that makes transformers is P8000 and there are direct costs of P110 for each unit produced. The manufacturer estimates that 100 units per month can be sold if the unit price is P250 and that sales will in crease by 20 units for each P10 decrease in price. Compute the number of units that must be sold per month to maximize the profit. Compute the unit price.

a. 190, P205
b. 160, P185
c. 170, P205
d. 200, P220

144. The total cost of producing and marketing x units of a certain commodity is given as C=(80000x-400x^2+x^3)/40000. For what number x is the average cost a minimum?

a. 200 units
b. 100 units
c. 300 units
d. 400 units

145. A wall 2.245m high is 2m away from a bldg. Find the shortest ladder that can reach the bldg with one end resting on the ground outside the wall.

a. 6m
b. 9m
c. 10m
d. 4m

146. If the hypotenuse of a right triangle is known, what is the relation of the base and the altitude of the right triangle when its area is maximum?

a. altitude=base

b. altitude=√2 base

c. altitude=√2 base

d. altitude=2 base

147. The hypotenuse of a right triangle is 20cm. What is the max possible area of the triangle in sq cm?

a. 100

b. 170

c. 120

d. 160

148. A rectangular field has an area of 10,000 sq m. What is the least amount of fencing meters to enclose it?

a. 400

b. 370

c. 220

d. 560

149. A monthly overhead of a manufacturer of a certain commodity is P6000 and the cost of material is P1.0 per unit. If not more than 4500 units are manufactured per month, labor cost is P0.40 per unit, but for each unit over 4500, the manufacturer must pay P0.60 for labor per unit. The manufacturer can sell 4000 units per month at P7.0 per unit and estimates that monthly sales will rise by 100 for each P0.10 reduction in price. Find the number of units that should be produced each month for maximum profit.

a. 4700 units

b. 2600 units

c. 6800 units

d. 9900 units

150. Find two numbers whose product is 100m and whose sum is minimum.

a. 10, 10

b. 12, 8

c. 5, 15

d. 9, 11

151. Find two numbers whose sum is 36 if the product of one by the square of the other is a maximum.

a. 12, 24

b. 13, 23

c. 20, 16

d. 11, 25

152. Find the minimum amount of thin sheet that can be made into a closed cylinder having a volume of 108 cu in. in square inches.

a. 125.5
b. 127.5
c. 123.5
d. 129.5

153. A buyer is to take a plot of land fronting street, the plot is to be rectangular and three times its frontage added to twice its depth is to be 96 meters. What is the greatest number of sq m be may take?

a. 384 sq m
b. 352 sq m
c. 443 sq m
d. 298 sq m

154. A company has determined that the marginal cost function for the production of a particular cost function for the production of a particular commodity is given as y”=125+10x-(x^2)/9 where y is the cost of producing x units of the commodity. If the fixed cost is 250 pesos, what is the cost of producing 15 units?

a. 250
b. 225
c. 300
d. 200

155. A pig weighing 300lb gains 8 pounds per day and cost 6 pesos per day to maintain. The market price for the pig is seven pesos and fifty centavos per pound but is decreasing 10 centavos per day. When should the pig be sold?

a. 15 days
b. 18 days
c. 20 days
d. 10 days

156. It costs a bus company P125 to run a bus on a certain tour, plus P15 per passenger. The capacity of the bus is 20 persons and the company charges P35 per ticket if the bus is full. For each empty seat, however, the company increases the ticket price by P2.0. For maximum profit how many empty seats would the company like to see?

a. 5
b. 3
c. 6
d. 4

157. A book publisher prints the pages of a certain book with 0.5 inch margins on the top, bottom and one side and a one inch margin on the other side to allow for the binding. Find the dimensions of the page that will maximize the printed area of the page if the area of the entire page is 96 sq inches.

a. 8 inches

b. 7 inches
c. 9 inches
d. 10 inches

158. The cost of manufacturing an engine parts is P300 and the number which can be sold varies inversely as the fourth power of the selling price. Find the selling price which will yield the greatest total net profit.

a. 400
b. 350
c. 450
d. 375

159. The price of the product in a competitive market is P300. If the cost per unit of producing the product is 160+x where x is the number of units produced per month, how many units should the firm produce and sell to maximize its profit?

a. 70
b. 80
c. 60
d. 50

160. If the cost per unit of producing a product by ABC company is 10+2x and if the price on the competitive market is P50, what is the maximum daily profit that the company can expect of this product?

a. 200
b. 300
c. 400
d. 600

161. An entrepreneur starts new companies and sells them when their growth is maximized. Suppose the annual profit for a new company is given by P(x)=22-x/2-18/(x+1) where P is in thousand of pesos and x is the number of years after the company is formed. If the entrepreneur wants to sell the company before profit begins to decline, after how many years would the company be sold?

a. 5
b. 4
c. 6
d. 7

162. The profit function for a product is P(x)=5600x+85x^2-x^3-x-200000. How many items will produce a maximum profit?

a. 80
b. 60
c. 70
d. 40

163. The following statistics of a manufacturing company shows the corresponding values for manufacturing x units.
Production cost=60x+10000 pesos
Selling price/unit=200-0.02x pesos
How many units must be produced for max profit?

a. 3500
b. 3300
c. 4000
d. 3800

164. The cost per unit of production is expressed as (4+3x) and the selling price on the competitive market is P100 per unit. What maximum daily profit that the company can expect of this product?

a. P768
b. P876
c. P657
d. P678

165. A certain unit produced by the company can be sold for 400-0.02x pesos where x is the number of units manufactured. What would be the corresponding price per unit in order to have a max revenue?

a. P200
b. P220
c. P150
d. P180

166. Given the cost equation of a certain product as follows C=50t^2-200t+10000 where t is in years. Find the maximum cost from the year 1995 to 2002.

a. P9,800
b. P6,400
c. P7,200
d. P10,600

167. The total cost of production a shipment of a certain product is C=5000x+125000/x where x is the number of machines used in the production. How many machines will minimize the total cost?

a. 5
b. 20
c. 10
d. 15

168. The demand x for a product is x=10000-100P where P is the market price in pesos per unit. The expenditure for the two product is E=Px. What market price will the expenditure be the greatest?

a. 50
b. 60

c. 70
d. 100

169. Analysis of daily output of a factory shows that the hourly number of units y produced after t hours of production is y=70t+(t^2)/2-t^3. After how many hours will the hourly number of units be maximized?

a. 5
b. 6
c. 7
d. 8

170. An inferior product with large advertising budget sells well when it is introduced, but sales fall as people discontinue use of the product. If the weekly sales are given by S=200t/(t+1)^2 where S is in millions of pesos and t in weeks. After how many weeks will the sales be maximized?

a. 1
b. 2
c. 3
d. 4

171. In the coming presidential election of 1998, it is estimated that the proportions P of votes that recognizes a certain presidentiables name t months after the campaign is given by P=[7.2t/(t^2+16)]+0.20. After how many months is the proportional maximized?

a. 4
b. 3
c. 5
d. 6

172. A car manufacturer estimates that the cost of production of x cars of a certain model is C=20x-0.01x^2-800. How many cars should be produced for a minimum cost?

a. 1000
b. 1200
c. 900
d. 1100

173. Analysis of daily output of a factory shows that the hourly number of units y produced after t hours of production is y=70t+(t^2)/2-t^3. After how many hours will the hourly number of units be maximized and what would be the maximum hourly output?

a. 5hrs, 237.5
b. 4hrs, 273.6
c. 6hrs, 243.5
d. 3hrs, 223.6

174. A time study showed that on average, the productivity of a worker after t hours on the job can be modeled by the expression P=27+6t-t^3 where P is the number of units produced per hour. What is the maximum productivity expected?

a. 36
b. 34
c. 44
d. 40

175. The sum of two numbers is equal to S. Find the minimum sum of the cube of the two numbers/

a. (S^3)/4
b. S/4
c. (S^2)/4
d. (S^3)/5

176. Given the cost equation of a certain product as follows: C=50t^2-200t+10000 where t is in years. Find the maximum cost from year 1995 to 2002.

a. P9000
b. P9800
c. P8500
d. P7300

177. A manufacturer determines that the profit derived from selling x units of a certain item is given by P=0.003x^2+10x. Find the marginal profit for a production of 50 units.

a. P10.30
b. P12.60
c. P15.40
d. P17.30

178. The total cost of production spare parts of computers is given as C=4000x-100x^2+x^3 where x is the number of units of spare parts produced so that the average cost will be minimum?

a. 50
b. 10
c. 20
d. 4

179. A viaduct is traversed by a truck running at 15mph at the same time that another truck traveling at a speed of 30mph on the street 22ft below and at right angle to the viaduct, approached the point directly below the viaduct from a distance of 55ft. Find the nearest distance between the trucks.

a. 33 ft
b. 44 ft
c. 29 ft
d. 39 ft

180. A sector is cut out of a circular disk of radius √3 and the remaining part of the disk I bent up so that the two edges join and a cone is formed. What is the largest volume for the cone?

a. $2\pi/3$
b. $\pi/3$
c. $3\pi/4$
d. $\pi/4$

181. Four squares are cut out of a rectangular cardboard 50cm by 80 cm. in dimension and the remaining piece is folded into a closed, rectangular box with two extra flaps trucked in. What is the largest possible volume for such a box?
a. 9000
b. 6000
c. 7000
d. 8000

182. An isosceles triangle with equal sides of 20cm has these sides at a variable equal angle with the base. Determine the max area of the triangle.
a. 200 sq cm
b. 250 sq cm
c. 300 sq cm
d. 280 sq cm

183. Formerly, for a package to go by parcel post, the sum of its length and girth could not exceed 120cm. Find the dimensions of the rectangular package of greatest volume that could be sent.
a. 20 x 20 x 40
b. 20 x 20 x 20
c. 20 x 40 x 10
d. 40 x 20 x 30

184. The cross-section of a trough is an isosceles trapezoid. If the trough is made by bending up the sides of s strip of metal 12cm wide, what would be the angle of inclination of the sides and the width across the bottom if the cross-sectional area is to be a maximum?
a. 60 degrees
b. 120 degrees
c. 45 degrees
d. 75 degrees

185. Find the minimum amount of thin sheet that can be made into a closed cylinder having a volume of 108cu inches in square inches.
a. 125.5
b. 127.5
c. 123.5
d. 129.5

186. Compute the abscissa of the min point of the curve y=x^3-12x-9.
a. 2

b. -2
c. -1
d. 1

187. What value of x does a maximum of y=x^3-3x occur?
a. -1
b. 1
c. 2
d. -2

188. Determine the point on the curve y^2=8x which is nearest to the external curve (4,2).
a. (2,4)
b. (4,3)
c. (3,5)
d. (6,8)

189. The LRT system runs from the Bonifacio Monument to Baclaran for a total distance of 15km. The cost of electric energy consumed by a train per hour is directly proportional to the cube of its speed and is P250 per hour at 50kph. Other expenses such as salaries, depreciation, overhead, etc. amounts to P1687.50 per hour. Find the most economical speed of the train in kph.
a. 75
b. 80
c. 65
d. 60

190. A businessman found out that his profit varies as the product of the amount spent for production and the square root of the amount spent for advertisement. If his total budget for these expenses is P1.5 million, how much must be allocated for advertisement to maximize his profit?
a. 0.5M
b. 0.7M
c. 0.8M
d. 1.0M

191. A steel girder 16m long is moved on rollers along a passageway 8m wide and into a corridor at right angles with the passageway. Neglecting the width of thr girder, how wide must the corridor be?
a. 3.6 m
b. 1.4 m
c. 1.8 m
d. 2.8 m

192. A can manufacturer receives an order for milk cans having a capacity of 100 cu cm. Each can is made from a rectangular sheet of metal by rolling the sheet into a cylinder;

the lids are stamped out from another rectangular sheet. What are the most economical proportions of the can?

a. 2.55
b. 2.59
c. 2.53
d. 3.67

193. A triangle has a variable sides x, y and z subject to the constraint that the perimeter P is fixed to 18cm. What is the maximum possible area for the triangle?

a. 15.59 sq cm
b. 18.71 sq cm
c. 14.03 sq cm
d. 17.15 sq cm

194. Postal regulations require that a parcel post package shall be not greater than 600cm in the sum of its length and girth (perimeter of the cross-section). What is the volume in cu cm of the largest package allowed by the postal regulations if the package is to be rectangular in cu cm?

a. 2 x 10^6
b. 3 x 10^6
c. 1.5 x 10^6
d. 4 x 10^6

195. Divide 60 into 3 parts so that the product of the three parts will be a maximum, find the product.

a. 8000
b. 4000
c. 6000
d. 12000

196. Find the radius of the circle inscribe in a triangle having a max area of 173.205 sq cm.

a. 3.45 cm
b. 5.77 cm
c. 4.96 cm
d. 2.19 cm

197. The area of a circle inscribe in a triangle is equal to 113.10 sq cm. Find the max area of the triangle.

a. 186.98 sq cm
b. 156. 59 sq cm
c. 175.80 sq cm
d. 193. 49 sq cm

198. Find the perimeter of a triangle having a max area that is circumscribing a circle of radius 8cm.

a. 83.13 cm
b. 85.77 cm
c. 84.96 cm
d. 92.19 cm

199. Suppose y is the number of workers in the labor force neededtp produce x units of a certain commodity and x=4y^2. If the production of the commodity this year is 25000 units and the production is increasing at the rate and the production is increasing at the rate of 18000 units per year, what is the current rate at which the labor force should be increased?

a. 9
b. 7
c. 10
d. 15

200. Sugar juice is filtering through a conical funnel 20cm, deep and 12cm across top, into a cylindrical container whose diameter is 10cm. When the depth of the juice in the funnel is 10cm, determine the rate at which its level in the cylinder is rising.

a. 0.45
b. 1.25
c. 0.75
d. 0.15

201. An airplane, flying horizontally at an altitude of 1km, passes directly over an observer. If the constant speed of the plane is 240kph, how fast is its distance from the observer increasing 30seconds later?

a. 214.66 kph
b. 256.34 kph
c. 324.57 kph
d. 137.78 kph

202. A metal disk expands during heating. If its radius increases at the rate of 20 mm per second, how fast is the area of one of its faces increasing when its radius is 8.1 meters?

a. 1.018 sq m per sec
b. 1.337 sq m per sec
c. 0.846 sq m per sec
d. 1.632 sq m per sec

203. The structural steel work of a new office building is finished. Across the street 20m from the ground floor of the freight elevator shaft in the building, a spectator is standing and watching the freight elevator ascend at a constant rate of 5 meters per second. How fast is the angle of elevation of the spectator's line of sight to the elevator increasing 6 seconds after his line of sight passes the horizontal?

a. 1/13
b. 1/15
c. 1/10

d. 1/12

204. A boy rides a bicycle along the Quezon Bridge at a rate of 6m /s. 24m directly below the bridge and running at right angles to it is a highway along which an automobile is traveling at the rate of 80m/s. How far is the distance between the boy and the automobile changing when the boy is 6m, past the point directly over the path of the automobile and the automobile is 8m past the point directly under the path of the boy?

a. 26 m/s
b. 20 m/s
c. 28 m/s
d. 30 m/s

205. A point moves on the parabola y^2=8 in such a way that the rate of change of the ordinate is always 5 units per sec. How fast is the abscissa changing when the ordinate is 4?

a. 5
b. 4
c. 3
d. 7

206. An air traffic controller spots two planes at the same altitude converging on a point as they fly at right angles to one another. One plane is 150miles from the point and is moving at 450 mph. The other plane is 200 miles from the point and has the speed of 600 mph. How much time does the traffic controller have to get one of the planes on a different flight path?

a. 20 min
b. 25 min
c. 30 min
d. 15 min

207. An LRT train 6 m above the ground crosses a street at a speed of 9 m/s, at the instant that a car approaching at a speed of 4 m/s is 12 m up the street. Find the rate of the LRT train and the car are separating one second later.

a. 3.64 m/s
b. 4.34 m/s
c. 6.43 m/s
d. 4.63 m/s

208. A street light is 8m from a wall and 4m from a point along the path leading to the shadow of the man 1.8m tall shortening along the wall when he is 3m from the wall. The man walks towards the wall at the rate of 0.6m/s.

a. -0.192 m/s
b. -1.018 m/s
c. -0.826 m/s
d. -0.027 m/s

209. A mercury light hangs 12 ft above the island at the center of Ayala Avenue whish is 24 ft wide. A cigarette vendor 5ft tall walks along the curb of the street at a speed of 420 fpm. How fast is the tip of the shadow of the cigarette vendor moving at the same instant?

a. 12 fps
b. 15 fps
c. 10 fps
d. 14 fps

210. The sides of an equilateral triangle are increasing at the rate of 10m/s. What is the length of the sides at the instant when the area is increasing 100 sq m/sec?

a. 20/√3
b. 22/√3
c. 25/√3
d. 15/√3

211. Water is the flowing into a conical vessel 15cm deep and having a radius of 3.75cm across the top. If the rate at which water is rising is 2cm/s, how fast is the water flowing into the conical vessel when the depth of water is 4cm?

a. 6.28 cu m/min
b. 4 cu m/min
c. 2.5 cu m/min
d. 1.5 cu m/min

212. Two sides of a triangle are 5 and 8 units respectively. If the included angle is changing at the rate of one radian pr second, at what rate is the third side changing when the included angle is 60 degrees?

a. 4.95 units/sec
b. 5.55 units/sec
c. 4.24 units/sec
d. 3.87 units/sec

213. The two adjacent sides of a triangle are 5 and 8 meters respectively. If the included angle is changing at the rate of 2 rad/sec, at what rate is the area of the triangle changing if the included angle is 60 degrees?

a. 20 sq m/sec
b. 25 sq m/sec
c. 15 sq m/sec
d. 23 sq m/sec

214. A triangular trough is 12m long, 2m wide at the top and 2m deep. If water flows in at the rate of 12 cu m per min, find how fast the surface is rising when the water is 1m deep.

a. 1
b. 2
c. 3
d. 4

215. A man starts from a point on a circular track of radius 100m and walks along the circumference at the rate of 40m/min. An observer is stationed at a point on the track directly opposite the starting point and collinear with the center of the circular track. How fast is the man's distance form the observer changing after one minute?

a. -7.95 m/min
b. -6.48 m/min
c. 8.62 m/min
d. 9.82 m/min

216. A plane 3000ft from the earth is flying east at the rate of 120mph. It passes directly over a car also going east at 60mph. How fast are they separating when the distance between them is 5000ft?

a. 70.4 ft/sec
b. 84.3 ft/sec
c. 76.2 ft/sec
d. 63.7 ft/sec

217. A horseman gallops along the straight shore of a sea at the rate of 30mph. A battleship anchored 3 miles offshore keeps searchlight trained on him as he moved along. Find the rate of rotation of the light when the horseman is 2 miles down the beach?

a. 6.92 rad/sec
b. 4.67 rad/sec
c. 5.53 rad/sec
d. 6.15 rad/sec

218. Find the point in the parabola y^2=4x at which the rate of change of the ordinate and abscissa are equal.

a. (1,2)
b. (-1,4)
c. (2,1)
d. (4,4)

219. Water flows into a vertical cylindrical tank, at the rate of 1/5 cu ft/sec. The water surface is rising at the rate of 0.425ft/min. What is the diameter of the tank?

a. 6 ft
b. 10 ft
c. 8 ft
d. 4 ft

220. The radius of a sphere is changing at a rate of 2 cm/sec. Find the rate of change of the surface area when the radius is 6cm.

a. 96π sq cm/sec
b. 78π sq cm/sec
c. 84π sq cm/sec
d. 68π sq cm/sec

221. The radius of a circle is increasing at the rate of 2cm/min. Find the rate of change of the area when r=6cm.

a. 24 π sq cm/sec
b. 36 π sq cm/sec
c. 18 π sq cm/sec
d. 30 π sq cm/sec

222. All edges of a cube are expanding at the rate of 3cm/sec. How fast is the volume changing when each edge is 10cm long?

a. 900 cu cm/sec
b. 800 cu cm/sec
c. 600 cu cm/sec
d. 400 cu cm/sec

223. A spherical balloon is inflated with gas at the rate of 20 cu m/min. How fast is the radius of the balloon changing at the instant the radius is 2cm?

a. 0.398
b. 0.422
c. 0.388
d. 0.498

224. The base radius of a cone is changing at a rate of 3cm/sec. Find the rate of change of its volume when the radius is 4cm and its altitude is 6cm.

a. 48 π cu cm/sec
b. 24 π cu cm/sec
c. 18 π cu cm/sec
d. 36 π cu cm/sec

225. The edge of cube is changing at a rate of 2 cm/min. Find the rate of change of its diagonal when each edge is 10cm long.

a. 3.464 cm/min
b. 5.343 cm/min
c. 2.128 cm/min
d. 6.283 cm/min

226. The radius of a circle is changing at a rate of 4cm/sec. Determine the rate of change of the circumference when the radius is 6cm.

a. 8 π cm/sec
b. 6 π cm/sec
c. 10 π cm/sec
d. 4 π cm/sec

227. When a squares of side x are cut from the corners of a 12cm square piece of cardboard, an open top box can be formed by folding up the sides. The volume of this box is given by V=x(12-2x)^2. Find the rate of change of volume when x=1cm.

a. 60
b. 40
c. 30
d. 20

228. As x increases uniformly at the rate of 0.002 ft/sec, at what rate is expression (1+x) to the third power increasing when x becomes 8ft?
a. 0.486 cfs
b. 0.430 cfs
c. 0.300 cfs
d. 0.346 cfs

229. A trough 10m long has as it ends isosceles trapezoids, altitude 2m, lower base, 2m upper base 3m. If water is let in at a rate of 3 cu m/min, how fast is the water level rising when the water is 1m deep?
a. 0.12
b. 0.18
c.0.21
d. 0.28

230. a launch whose deck is 7 m below the level of a wharf is being pulled toward the wharf by a rope attached to a ring on the deck. If a winch pulls in the rope at the rate of 15 m/min, how fast is the launch moving through the water when there are 25m of rope out?
a. -15.625
b. 14.525
c. -14.526
d. 15.148

231. An object is dropped freely from a bldg. having a height of 40m. An observer at a horizontal distance of 30m from a bldg is observing the object is it was dropped. Determine the rate at which the distance between the object and the observer is changing after 2sec.
a. -11.025
b. 12.25
c. -10.85
d. 14.85

232. Car A moves due east at 30kph at the same instant car B is moving S 30deg E.with a speed of 30kph. The distance from A to B is 30km. Find how fast is the speed between them are separating after one hour.
a. 45 kph
b. 36 kph
c. 40 kph
d. 38 kph

233. Water is flowing into a frustum of a cone at a rate of 100 liter/min. The upper radius of the frustum of a cone is 1.5m while the lower radius is 1m and a height of 2m. If the water rises at the rate of 0.04916 cm/sec, find the depth of water.

a. 15.5cm
b. 10.3cm
c. 13.6cm
d. 18.9cm

234. Water is flowing into a conical vessel 18 cm deep and 10 cm across the top. If the rate at which the water surface is rising is 27.52 mm/sec, how fast is the water flowing into the conical vessel when the depth of water is 12cm?

a. 9.6 cu cm/sec
b. 7.4 cu cm/sec
c. 8.5 cu cm/sec
d. 6.3 cu cm/sec

235. Sand is falling off a conveyor onto a conical pile at the rate of 15 cu cm/min. The base of the cone is approximately twice the altitude. Find the height of the pile if the height of he pile is changing at the rate of 0.047746 cm/min.

a. 10 cm
b. 12 cm
c. 8 cm
d. 6 cm

236. A company is increasing its production of a certain product at the rate of 100 units per month. The monthly demand function is given by P=100-x/800. Find the rate of change of the revenue with respect to time in months when the monthly production is 4000.

a. P9000/month
b. P8000/month
c. P6000/month
d. P4000/month

237. A machine is rolling a metal cylinder under pressure. The radius of the cylinder is decreasing at the rate of 0.05 cm/sec and the volume V is 128π cu cm. At what rate is the length h changing when the radius is 2.5cm?

a. 0.8192 cm/sec
b. 0.7652 cm/sec
c. 0.6178 cm/sec
d. 0.5214 cm/sec

238. Two sides of a triangle are 15cm and 20cm long respectively. How fast is the third side increasing if the angle between the given sides is 60 degrees and is increasing at the rate of 2deg/sec?

a. 0.05 cm/s
b. 2.70 cm/s

c. 1.20 cm/s
d. 3.60 cm/s

239. Two sides of a triangle are 30cm and 40cm respectively. How fast is the area of the triangle increasing if the angle between the sides is 60 degrees and is increasing at the rate of 4deg/sec?

a. 20.94
b. 29.34
c. 14.68
d. 24.58

240. A man 6ft tall is walking toward a building at the rate of 5ft/sec. If there is a light on the ground 50ft from a bldg, how fast is the man's shadow on the bldg growing shorter when he is 30ft from the bldg?

a. -3.75 fps
b. -7.35 fps
c. -5.37 fps
d. -4.86 fps

241. The volume of the sphere is increasing at the rate of 6 cu cm/hr. At what rate is its surface area increasing when the radius is 50 cm (in cu cm/hr)?

a. 0.36
b. 0.50
c. 0.40
d. 0.24

242. A particle moves in a plane according to the parametric equations of motions: x=t^2, y=t^3. Find the magnitude of the acceleration when t=2/3.

a. 4.47
b. 5.10
c. 4.90
d. 6.12

243. A particle moves along the right-hand part of the curve 4y^3=x^2 with a speed Vy=dy/dx=constant at 2. Find the speed of motion when y=4.

a. 12.17
b. 14.10
c. 15.31
d. 16.40

244. The equations of motion of a particle moving in a plane are x=t^2, y=3t-1 when t is the time and x and y are rectangular coordinates. Find the speed of motion at the instant when t=2.

a. 5
b. 7
c. 9

d. 10

245. A particle moves along the parabola y^2=4x with a constant horizontal component velocity of 2m/s. Find the vertical component of the velocity at the point (1,2).

a. 2 m/s
b. 7 m/s
c. 5 m/s
d. 4 m/s

246. The acceleration of the particle is given by a=2+12t in m/s^2 where t is the time in minutes. If the velocity of this particle is 11 m/s after 1min, find the velocity after 2minutes.

a. 31 m/s
b. 45 m/s
c. 37 m/s
d. 26 m/s

247. A particle moves along a path whose parametric equations are x=t^3 and y=2t^2. What is the acceleration when t=3sec.

a. 18.44 m/sec^2
b. 15.93 m/sec^2
c. 23.36 m/sec^2
d. 10.59 m/sec^2

248. A vehicle moves along a trajectory having coordinates given as x=t^3 and y=1-t^2. The acceleration of the vehicle at any point of the trajectory is a vector having magnitude and direction. Find the acceleration when t=2.

a. 12.17
b. 13.20
c. 15.32
d. 12.45

249. The search light of a lighthouse which is positioned 2km from the shoreline is tracking a car which is traveling at a constant speed along the shore. If the searchlight is rotating at the rate of 0.25 rev per hour, determine the speed of the car when it is 1km away from the point on the shore nearest to the lighthouse.

a. 3.93 kph
b. 4.16 kph
c. 2.5 kph
d. 1.8 kph

250. A light is at the top of a pole 80 ft high. A ball is dropped at the same height from a point 20 ft from the light. Assuming that the ball falls according to S=16t^2, how fast is the shadow of the ball moving along the ground 1 second later?

a. -200 ft/sec
b. -180 ft/sec

c. -240 ft/sec
d. -140 ft/sec

251. Water is poured at the rate of 8 cu ft/min into a conical shaped tank, 20 ft deep and 10 ft diameter at the top. If the tank has a leak in the bottom and the water level is rising at the rate of 1 inch/min, when the water is 16 ft deep, how fast is the water leaking?

a. 3.81 cu ft/min
b. 4.28 cu ft/min
c. 2.96 cu ft/min
d. 5.79 cu ft/min

252. An airplane is flying at a constant speed at an altitude of 10000ft on a line that will take it directly over an observer on the ground. At a given instant the observer notes that the angle of elevation of the airplane is $\pi/3$ radians and is increasing at the rate of 1/60 rad/sec. Find the speed of the airplane.

a. -222.22 ft/sec
b. -232.44 ft/sec
c. -332.22 ft/sec
d. -432.12 ft/sec

253. A horizontal trough is 16 m long and its ends are isosceles trapezoids with an altitude of 4m lower base of 4m and an upper base of 6m. If the water level is decreasing at the rate of 25 cm/min, when the water is 3m deep, at what rate is water being drawn from the trough?

a. 22 cu m/min
b. 25 cu m/min
c. 20 cu m/min
d. 30 cu m/min

254. The sides of an equilateral triangle is increasing at rate of 10 cm/min. What is the length of the sides if the area is increasing at the rate of 69.82 sq cm/min?

a. 8 cm
b. 10 cm
c. 5 cm
d. 15 cm

255. The two adjacent sides of a triangle are 6m and 8m respectively. If the included angle is changing at the rate of 3 rad/min, at what rate is the area of a triangle changing if the included angle is 30 degrees?

a. 62.35 sq m
b. 65.76 sq m
c. 55.23 sq m
d. 70.32 sq m

256. Water is pouring into a swimming pool. After t hours, there are $t+\sqrt{t}$ gallons in the pool. At what rate is the water pouring into the pool when t=9hours?

a. 7/6 gph
b. 1/6 gph
c. 3/2 gph
d. ½ gph

257. A point on the rim of a flywheel of radius cm, has a vertical velocity of 50 cm/sec at a point P, 4cm above the x-axis. What is the angular velocity of the wheel?
a. 16.67 rad/sec
b. 14.35 rad/sec
c. 19.95 rad/sec
d. 10.22 rad/sec

258. A spherical balloon is filled with air at the rate of 2 cu cm/min. Compute the time rate of change of the surface are of the balloon at the instant when its volume is $32\pi/3$ cu cm.
a. 2 cu cm/min
b. 3 cu cm/min
c. 4 cu cm/min
c. 5 cu cm/min

259. The coordinate (x,y) in ft of a moving particle P are given by x=cos(t)-1 and y=2sin(t)+1, where t is the time in seconds. At what extreme rates in fps is P moving along the curve?
a. 2 and 1
b. 3 and 2
c. 2 and 0.5
d. 3 and 1

260. A bomber plane is flying horizontally at a velocity of 440 m/s and drops a bomb to a target h meters below the plane. At the instant the bomb was dropped, the angle of depression of the target is 45 degrees and is increasing at the rate of 0.05 rad/sec. Determine the value of h.
a. 4400 m
b. 2040 m
c. 3500 m
d. 6704 m

261. Glycerine is flowing into a conical vessel 18cm deep and 10 cm across the top at the rate of 4 cu cm per min. The deep of glyerine is h cm. If the rate which the surface is rising is 0.1146 cm/min, find the value of h.
a. 12 cm
b. 16 cm
c. 20 cm
d. 25 cm

262. Helium is escaping from a spherical balloon at the rate of 2 cu cm/min. When the surface area is shrinking at the rate of sq cm/min, find the radius of the spherical balloon.

a. 12 cm
b. 16 cm
c. 20 cm
d. 25 cm

263. Water is running into hemispherical bowl having a radius of 10 cm at a constant rate of 3 cu cm/min. When the water is h cm deep, the water level is rising at the rate of 0.0149 cm/min. What is the value of h?

a. 4 cm
b. 6 cm
c. 2 cm
d. 5 cm

264. A train, starting noon, travels north at 40 mph. Another train starting from the same pint at 2pm travels east at 50mph. How fast are the two trains separating at 3pm?

a. 56.15 mph
b. 98.65 mph
c. 46.51 mph
d. 34.15 mph

265. An automobile is traveling at 30 fps towards north is approaching an intersection. When the automobile is 120ft from the intersection, a truck traveling at 40fps towards east is 60ft from the same intersection. The automobile and the truck are on the roads that are at right angles to each other. How fast are they separating after 6 sec?

a. 47.83 fps
b. 87.34 fps
c. 23.74 fps
d. 56.47 fps

266. A train, starting noon, travels north at 40 mph. Another train starting from the same point at 2pm travels east at 50 mph. How fast are the trains separating after a long time?

a. 64 mph
b. 69 mph
c. 46 mph
d. 53 mph

267. At noon a car drives from A towards the east at 60mph. Another car starts from B towards A at 30 mph. B has a direction and distance of N 30 degrees east and 42m respectively from A. Find the time when the cars will be nearest each other.

a. 24 min after noon
b. 23 min after noon
c. 25 min after noon
d. 26 min after noon

268. A ferris wheel 15 m in diameter makes 1 rev every 2 min. If the center of the wheel is 9m above the ground, how many fast is a passenger in the wheel moving vertically when he is 12.5 above the ground?

a. 20.84 m/min
b. 24.08 m/min
c. 22.34 m/min
d. 25.67 m/min

269. A bomber plane, flying horizontally 3.2 km above the ground is sighting on at a target on the ground directly ahead. The angle between the line of sight and the pad of the plane is changing at the rate of 5/12 rad/min. When the angle is 30 degrees, what is the speed of the plane in mph?

a. 200
b. 260
c. 220
d. 240

270. Two railroad tracks are perpendicular to each other. At 12pm there is a train at each track was approaching the crossing at 50kph, one being 100km the other 150km away from the crossing. How fast in kph is the distance between the two trains changing at 4pm?

a. 67.08 kph
b. 68.08 kph
c. 69.08 kph
d. 70.08 kph

271. a ball is thrown vertically upward and its distance from the ground is given as S=104t-16t^2. Find the maximum height to which the ball will rise if S is expressed in meters and t in seconds.

a. 169m
b. 190m
c. 187m
d. 169m

272. If f(x)=ax^3+bx^2+cx, determine the value of a so that the graph will have a point of inflection at (1,-1) and so that the slope of the inflection tangent there will be -3.

a. 2
b. 5
c. 3
d. 4

273. If f(x)=ax^3+bx^2, determine the values of a and b so that the graph will have a point of inflection at (2,16).

a. -1, 6
b. -2, 5
c. -1, 7

d. -2, 8

274. Under what condition is the inflection point of y=ax^3+bx^2+cx+d on the y-axis?

a. b=0
b. b=1
c. b=3
d. b=4

275. Find the equation of the curve whose slope is 4x-5 and passing through (3,1).

a. 2x^2-5x-2
b. 5x^2-9x-1
c. 5x^2+7x-2
d. 2x^2-8x+5

276. The point (3,2) is on a curve and at any point (x,y) on the curve the tangent line has a slope equal to 2x-3. Find the equation of the curve.

a. y=x^2-3x-4
b. y=x^2-3x+2
c. y=x^2+8x+5
d. y=x^3+3x-3

277. If m is the slope of the tangent line to the curve y=x^2-2x^2+x at the point (x,y), find the instantaneous rate of change of the slope m per unit change in x at the point (2,2).

a. 8
b. 9
c. 10
d. 11

278. Suppose the daily profit from the production and sale of x units of a product is given by P=180x-(x^2)/1000-2000. At what rate is the profit changing when the number of units produced and sold is 100 and is increasing at 10 units per day?

a. P1798
b. P1932
c. P2942
d. P989

279. The population of a city was found to be given by P=40500e^(0.03t) where t is the number of years after 1990. At what rate is the population expected to be growing in 2000?

a. 1640
b. 2120
c. 2930
d. 1893

280. A bridge is h meters above a river which lies perpendicular to the bridge. A motorboat going 3 m/s passes under the bridge at the same instant that a man walking 2

m/s reaches that point simultaneously. If the distance between them is changing, at the rate of 2.647 m/s after 3 seconds, find the value of h.

a. 10
b. 12
c. 14
d. 8

281. What is the area bounded by the curve x^2=-9y and the line y+1=0.

a. 6
b. 5
c. 4
d. 3

282. What is the area bounded by the curve y^2=x and the line x-4=0?

a. 10
b. 32/3
c. 31/3
d. 11

283. What is the area bounded by the curve y^2=4x and x^2=4y.

a. 6
b. 7.333
c. 6.666
d. 5.333

284. Find the area bounded by the curve y=9-x^2 and the x-axis.

a. 25 sq units
b. 36 sq units
c. 18 sq units
d. 30 sq units

285. Find the area bounded by the curve y^2=9x and its latus rectum.

a. 10.5
b. 13.5
c. 11.5
d. 12.5

286. Find the area bounded by the curve 5y^2=164x and the curve y^2=8x-24.

a. 30
b. 20
c. 16
d. 19

287. Find the area bounded by the curve y^2=4x and the line 2x+y=4.

a. 10
b. 9

c. 7
d. 4

288. Find the area bounded by the curve y=1/x with and upper limit of y=2 and a lower limit of y=10.
a. 1.61
b. 2.61
c. 1.81
d. 2.81

289. By integration, determine the area bounded by the curves y=6x-x^2 and y=x^2-2x.
a. 25.60 sq units
b. 21.33 sq units
c. 17.78 sq units
d. 30.72 sq units

290. What is the appropriate total area bounded by the curve y=sin x and y=0 over the interval $0 \leq x \leq 2\pi$ (in radians).
a. $\pi/2$
b. 2
c. 4
d. 0

291. What is the area between y=0, y=3x^2, x=0 and x=2?
a. 8
b. 24
c. 12
d. 6

292. Determine the tangent to the curve 3y^2=x^3 at (3,3) and calculate the area of the triangle bounded by the tangent line, the x-axis and the line x=3.
a. 3.50 sq units
b. 2.50 sq units
c. 3.00 sq units
d. 4.00 sq units

293. Find the areas bounded by the curve y=8-x^3 and the x-axis.
a. 12 sq units
b. 15 sq units
c. 13 sq units
d. 10 sq units

294. Find the area in the first quadrant bounded by the parabola, y^2=4x and the line x=3 and x=1.
a. 9.535
b. 5.595
c. 5.955

d. 9.955

295. Find the area (in sq units) bounded by the parabola x^2-2y=0 and x^2=-2y+8.

a. 11.7
b. 4.7
c. 9.7
d. 10.7

296. In x years from now, one investment plan will be generating profit at the rate of R1(x)=50+x^2 pesos per yr, while a second plan will be generating profit at the rate R2(x)=200+5x pesos per yr. For how many yrs will the second plan be more profitable one? Compute also the net excess profit if the second plan would be used instead of the first.

a. 15yrs, P1687.50
b. 12yrs, P1450.25
c. 14yrs, P15640.25
d. 10yrs, P1360.25

297. An industrial machine generates revenue at the rate R(x)=5000-20x^2 pesos per yr and results in cost that accumulates at the rate of C(x)=2000+10x^2 pesos per yr. For how many yrs (x) is the use of this machine profitable? Compute also that net earnings generated by the machine at this period.

a. 10yrs, P20000
b. 12yrs, P25000
c. 15yrs, P30000
d. 14yrs, P35000

298. Find the area under one arch of the curve y=sin(x/2).

a. 4
b. 7
c. 3
d. 5

299. Find the area bounded by the curve y=arc sin x, x=1 and y=π/2 on the first quadrant.

a. 0
b. 2
c. 1
d. 3

300. Find the area bounded by the curve y=8-x^3, x=0, y=0.

a. 12
b. 11
c. 15
d. 13

301. Find the area bounded by the curve y=cos hx, x=0, x=1 and y=0.

a. 1.175
b. 1.234
c. 1.354
d. 1.073

302. Find the area in the first quadrant under the curve y-sin hx from x=0 to x=1.
a. 0.543
b. 0.453
c. 0.345
d. 0.623

303. Find the area of the region in the first quadrant bounded by the curves y=sin x, y=cos x and the y-axis.
a. 0.414
b. 0.534
c. 0.356
d. 0.486

304. Find the area of the region bounded by the x-axis, the curve y=6x-x^2 and the vertical lines x=1 and x=4.
a. 24
b. 23
c. 25
d. 22

305. Find the area bounded by the curve y=e^x, y=e^-x and x=1, by integration.
a. [(e-1)^2]/e
b. (e^2-1)/e
c. (e-1)/e
d. [(e-1)^2]/(e^2)

306. Suppose a company wants to introduce a new machine that will produce a rate of annual savings S(x)=150-x^2 where x is the number of yrs of operation of the machine, while producing a rate of annual costs of C(x)=(x^2)+(11x/4). For how many years will it be profitable to use this new machine?
a. 7 yrs
b. 6 yrs
c. 8 yrs
d. 10 yrs

307. Suppose a company wants to introduce a new machine that will produce a rate of annual savings S(x)=150-x^2 where x is the number of yrs of operation of the machine, while producing a rate of annual costs of C(x)=(x^2)+(11x/4). What are the net total savings during the first year of use of the machine?
a. 122
b. 148

c. 257
d. 183

308. Suppose a company wants to introduce a new machine that will produce a rate of annual savings S(x)=150-x^2 where x is the number of yrs of operation of the machine, while producing a rate of annual costs of C(x)=(x^2)+(11x/4). What are the net total savings over the entire period of use of the machine?

a. 771
b. 826
c. 653
d. 711

309. The price in pesos for a certain product is expressed as p(x)=900-80x-x^2 when the demand for the product is x units. Also the function p(x)=x^2+10x gives the price in pesos when the supply is x units. Find the consumer and producers surplus.

a. P4500; P3375
b. P3400; P4422
c. P5420; P3200
d. P4000; P3585

310. A horse is tied ouside of a circular fence of radius 4m by a rope having a length of 4π m. Determine the area on which the horse can graze.

a. 413.42 sq m
b. 484.37 sq m
c. 398.29 sq m
d. 531.36 sq m

311. A dog is tied to an 8m circular tank by a 3m length of cord. The cord remains horizontal. Find the area over which the dog can move.

a. 16.387 sq m
b. 15.298 sq m
c. 10.286 sq m
d. 13.164 sq m

312. Find the area bounded by the curve y^2=8(x-4), the line y=4, y-axis and x-axis.

a. 18.67
b. 14.67
c. 15.67
d. 17.67

313. Find the area enclosed by the parabola y^2=8x and the latus rectum.

a. 32/3 sq units
b. 29/4 sq units
c. 41/2 sq units
d. 33/2 sq units

314. What is the area bounded y the curve x^2=-9y and the line y+1=0

a. 6 sq units
b. 5 sq units
c. 2 sq units
d. 4 sq units

315. What is the area bounded by the curve y^2=x and the line x-4=0.

a. 23/4 sq units
b. 32/3 sq units
c. 54/4 sq units
d. 13/5 sq units

316. Find the area bounded by
The parabola x^2=4y and y=4.

a. 21.33 sq units
b. 33.21 sq units
c. 31.32 sq units
d. 13.23 sq units

317. What is the area bounded by the curve y^2=-2x and the line x=-2.

a. 18/3 sq units
b. 19/5 sq units
c. 16/3 sq units
d. 17/7 sq units

318. Find the area enclosed by the curve x^2+8y+16=0 the x-axis, y-axis and the line x-4=0.

a. 10.67
b. 9.67
c. 8.67
d. 7.67

319. Find the area bounded by the parabola y=6x-x(square) and y=x(square)-2x. Note, the parabola intersects at point (0,0) and (4,8).

a. 44/3
b. 64/3
c. 74/3
d. 54/3

320. Find the area of the portion of the curve y=cos x from x=0 to x=π/2.

a. 1 sq unit
b. 2 sq units
c. 3 sq units
d. 4 sq units

321. Find the area of the portion of the curve y=sin x from x=0 to x=π.

a. 2 sq units
b. 3 sq units
c. 1 sq unit
d. 4 sq units

322. Find the area bounded by the curve r^2=4cos2φ.
a. 8 sq units
b. 2 sq units
c. 4 sq units
d. 6 sq units

323. Find the area enclosed by the curve r^2=4cosφ.
a. 4
b. 8
c. 16
d. 2

324. Determine the period and amplitude of the function y=2sin5x.
a. 2π/5, 2
b. 3π/2, 2
c. π/5, 2
d. 3π/10, 2

325. Determine the period and amplitude of the function y=5cos2x.
a. π, 5
b. 3π/2, 2
c. π/5, 2
d. 3π/10, 2

326. Determine the period and amplitude of the function y=5sinx.
a. 2π, 5
b. 3π/2, 5
c. π/2, 5
d. π, 5

327. Determine the period and amplitude of the function y=3 cos x.
a. 2π, 3
b. π/2, 3
c. 3/2, 3
d. π, 3

328. Find the area of the curve r^2=a^2cosφ.
a. a^2
b. a
c. 2a
d. a^3

329. Find the area of the region bounded by the curve r^2=16cosθ.

a. 32 sq units
b. 35 sq units
c. 27 sq units
d. 30 sq units

330. Find the area enclosed by the curve r=a (1-sinθ).

a. (3a^2)π/2
b. (2a^2)π
c. (3a^2)π
d. (3a^2)π/5

331. Find the surface area of the portion of the curve x^2=y from y=1 to y=2 when it is revolved about the y-axis.

a. 19.84
b. 17.86
c. 16.75
d. 18.94

332. Find the area of the surface generated by rotating the portion of the curve y=(x^3)/3 from x=0 to x=1 about the x-axis.

a. 0.638
b. 0.542
c. 0.782
d. 0.486

333. Find the surface area of the portion of the curve x^2+y^2=4 from x=0 to x=2 when it is revolved about the y-axis.

a. 8π
b. 16π
c. 4π
d. 12π

334. Compute the surface area generated when the first quadrant portion if the curve x^2-4y+8=0 from x=0 to x=2 is revolved about the y-axis.

a. 30.64
b. 28.32
c. 26.42
d. 31.64

335. Find the total length of the curve r=4 (1-sin θ) from θ=90deg to θ=270deg and also the total perimeter of the curve.

a. 16, 32
b. 18, 36
c. 12, 24
d. 15, 30

336. Find the length of the curve r=4sinθ from θ=0 to θ=90deg and also the total length of the curve.

a. 2π; 4π
b. 3π; 6π
c. π; 2π
d. 4π; 8π

337. Find the length of the curve r=a (1-cos θ) from θ=0 to θ=π and also the total length of curve.

a. 4a; 8a
b. 2a; 4a
c. 3a; 6a
d. 5a; 10a

338. Find the total length of the curve r=a cos θ.

a. πa
b. 2πa
c. 3πa/2
d. 2πa/3

339. Find the length of the curve having a parametric equations of x= a cos^3 θ y=a sin^2 θ from θ=0 to θ=2π.

a. 5a
b. 6a
c. 7a
d. 8a

340. Find the centroid of the area bounded by the curve y=4-x^2 the line x=1 and the coordinate axes.

a. 1.85
b. 0.46
c. 1.57
d. 2.16

341. Find the centroid of the area under y=4-x^2 in the first quadrant.

a. 0.75
b. 0.25
c. 0.50
d. 1.15

342. Find the centroid of the area in first quadrant bounded by the curve y^2=4ax and latus rectum.

a. 3a/5
b. 2a/5
c. 4a/5

d. 1a

343. A triangular section has coordinates of A(2,2), B(11,2) and C(5,8). Find the coordinates of the centroid of the triangular section.

a. (7, 4)
b. (6, 4)
c. (8, 4)
d. (9, 4)

344. The following cross section has the following given coordinates. Compute for the centroid of the given cross section A(2,2); B(5,8); C(7,2); D(2,0) and E(7,0).

a. 4.6, 3.4
b. 4.8, 2.9
c. 5.2, 3.8
d. 5.3, 4.1

345. Sections ABCD is a quadrilateral having the given coordinates A(2,3); B(8,9); C(11,3); D(11,0). Compute the coordinates of the centroid of the quadrilateral.

a. (7.33, 4)
b. (7, 4)
c. (6.22, 3.8)
d. (7.8, 4.2)

346. A cross section consists of a triangle ABC and a semi circle with AC as its diameter. If the coordinates of A(2,6); B(11,9) and C(14,6), compute the coordinates of the centroid of the cross section.

a. 4.6, 3.4
b. 4.8, 2.9
c. 5.2, 3.8
d. 5.3, 4.1

347. Locate the centroid of the area bounded by the parabola y^2=4x, the line y=4 ad the y-axis.

a. 6/5, 3
b. 2/5, 3
c. 3/5, 3
d. 4/5, 3

348. Find the centroid of the area bounded by the curve x^2=-(y-4), the x-axis and the y-axis on the first quadrant.

a. ¾, 8/5
b. 5/4, 7/5
c. 7/4, 6/5
d. ¼, 9/5

349. Locate the centroid of the area bounded by the curve y^2=-3(x-6)/2 the x-axis and the y-axis on the first quadrant.

a. 12/5, 9/8
b. 13/5, 7/8
c. 14/5, 5/8
d. 11/5, 11/8

350. Locate the centroid of the area bounded by the curve 5y^2=16x and y^2=8x-24 on the first quadrant.

a. x=2.20; y=1.51
b. x=1.50; y=0.25
c. x=2.78; y=1.39
d. x=1.64; y=0.26

351. Locate the centroid of the area bounded by the parabola x^2=8y and x^2=16(y-2) in the first quadrant.

a. x=2.12; y=1.6
b. x=3.25; y=1.2
c. x=2.67; y=2.0
d. x=2; y=2.8

352. Given the area in the first quadrant bounded by x^2=8y, the line y-2 and the y-axis. What is the volume generated this area is revolved about the line y-2=0?

a. 53.31 cu units
b. 45.87 cu units
c. 28.81 cu units
d. 33.98 cu units

353. Given the area in the first quadrant bounded by x^2=8y, the line x=4 and the x-axis. What is the volume generated by revolving this area about y-axis?

a. 78.987 cu units
b. 50.265 cu units
c. 61.523 cu units
d. 82.285 cu units

354. Given the area in the first quadrant bounded by x^2=8y, the line y-2=0 and the y-axis. What is the volume generated when this area is revolved about the x-axis?

a. 20.32 cu units
b. 34.45 cu units
c. 40.21 cu units
d. 45.56 cu units

355. Find the volume formed by revolving the hyperbola xy=6 from x=2 to x=4 about the x-axis.

a. 28.27 cu units
b. 25.53 cu units

c. 23.23 cu units
d. 30.43 cu units

356. The region in the first quadrant under the curve y=sin h x from x=0 to x=1 is revolved about the x-axis. Compute the volume of solid generated.

a. 1.278 cu units
b. 2.123 cu units
c. 3.156 cu units
d. 1.849 cu units

357. A square hole of side 2cm is chiseled perpendicular to the side of a cylindrical post of radius 2cm. If the axis of the hole is going to be along the diameter of the circular section of the post, find the volume cut off.

a. 15.3 cu cm
b. 23.8 cu cm
c. 43.7 cu cm
d. 16.4 cu cm

358. A hole radius 1cm is bored through a sphere of radius 3cm, the axis of the hole being a diameter of a sphere. Find the volume of the sphere which remains.

a. (64π√2)/3 cu cm
b. (66π√3)/3 cu cm
c. (70π√2)/3 cu cm
d. (60π√2)/3 cu cm

359. Find the volume of common to the cylinders x^2+y^2=9 and y^2+z^2=9.

a. 241 cu m
b. 533 cu m
c. 424 cu m
d. 144 cu m

360. Given is the area in the first quadrant bounded by x^2=8y, the line y-2=0 and the y-axis. What is the volume generated when this area is revolved about the line y-2=0.

a. 28.41
b. 26.81
c. 27.32
d. 25.83

361. Given is the area in the first quadrant bounded by x^2=8y, the line x=4 and the x-axis. What is the volume generated when this area is revolved about the y-axis?

a. 50.26
b. 52.26
c. 53.26
d. 51.26

362. The area bounded by the curve y^2=12 and the line x=3 is revolved about the line x=3. What is the volume generated?

a. 185
b. 187
c. 181
d. 183

363. The area in the second quadrant of the circle x^2+y^2=36 is revolved about the line y+10=0. What is the volume generated?

a. 2218.63
b. 2228.83
c. 2233.43
d. 2208.53

364. The area enclosed by the ellipse (x^2)/9 + (y^2)/4 = 1 is revolved about the line x=3, what is the volume generated?

a. 370.3
b. 360.1
c. 355.3
d. 365.10

365. Find the volume of the solid formed if we rotate the ellipse (x^2)/9 + (y^2)/4 = 1 about the line 4x+3y=20.

a. 48 π^2 cu units
b. 45 π^2 cu units
c. 40 π^2 cu units
d. 53 π^2 cu units

366. The area on the first and second quadrant of the circle x^2+y^2=36 is revolved about the line x=6. What is the volume generated?

a. 2131.83
b. 2242.46
c. 2421.36
d. 2342.38

367. The area on the first quadrant of the circle x^2+y^2=25 is revolved about the line x=5. What is the volume generated?

a. 355.31
b. 365.44
c. 368.33
d. 370.32

368. The area on the second and third quadrant of the circle x^2+y^2=36 is revolved about the line x=4. What is the volume generated?

a. 2320.30
b. 2545.34

c. 2327.25
d. 2520.40

369. The area on the first quadrant of the circle x^2+y^2=36 is revolved about the line y+10=0. What is the volume generated?
a. 3924.60
b. 2229.54
c. 2593.45
d. 2696.50

370. The area enclosed by the ellipse (x^2)/16 + (y^2)/9 = 1 on the first and 2^{nd} quadrant is revolved about the x-axis. What is the volume generated?
a. 151.40
b. 155.39
c. 156.30
d. 150.41

371. The area enclosed by the ellipse 9x^2+16y^2=144 on the first quadrant is revolved about the y-axis. What is the volume generated?
a. 100.67
b. 200.98
c. 98.60
d. 54.80

372. Find the volume of an ellipsoid having the equation (x^2)/25 + (y^2)/16 + (z^2)/4 = 1.
a. 167.55
b. 178.40
c. 171.30
d. 210.20

373. Find the volume of a prolate spheroid having the equation (x^2)/25 + (y^2)/9 + (z^2)/9 = 1.
a. 178.90 cu units
b. 184.45 cu units
c. 188.50 cu units
d. 213.45 cu units

374. The region in the first quadrant which is bounded by the curve y^2=4x, and the lines x=4 and y=0, is revolved about the x-axis. Locate the centroid of the resulting solid of revolution.
a. 8/3
b. 7/3
c. 10/3
d. 5/3

375. The region in the first quadrant which is bounded by the curve x^2=4y, and the line x=4, is revolved about the line x=4. Locate the centroid of the resulting solid of revolution.

a. 0.8
b. 0.5
c. 1
d. 0.6

376. The area bounded by the curve x^3=y, the line y=8 and the y-axis is to be revolved about the y-axis. Determine the centroid of the volume generated.

a. 5
b. 6
c. 4
d. 7

377. The area bounded by the curve x^3=y, and the x-axis is to be revolved about the x-axis. Determine the centroid of the volume generated.

a. 7/4
b. 9/4
c. 5/4
d. ¾

378. The region in the 2^{nd} quadrant, which is bounded by the curve x^2=4y, and the line x=-4, is revolved about the x-axis. Locate the cenroid of the resulting solid of revolution.

a. -4.28
b. -3.33
c. -5.35
d. -2.77

379. The region in the 1^{st} quadrant, which is bounded by the curve y^2=4x, and the line x=-4, is revolved about the line x=4. Locate the cenroid of the resulting solid of revolution.

a. 1.25 units
b. 2 units
c. 1.50 units
d. 1 unit

380. Find the moment of inertia of the area bounded by the curve x^2=4y, the line y=1 and the y-axis on the first quadrant with respect to x-axis.

a. 6/5
b. 7/2
c. 4/7
d. 8/7

381. Find the moment of inertia of the area bounded by the curve x^2=4y, the line y=1 and the y-axis on the first quadrant with respect to y-axis.

a. 19/3
b. 16/15
c. 13/15
d. 15/16

382. Find the moment of inertia of the area bounded by the curve x^2=8y, the line x=4 and the x-axis on the first quadrant with respect to x-axis.
a. 1.52
b. 2.61
c. 1.98
d. 2.36

383. Find the moment of inertia of the area bounded by the curve x^2=8y, the line x=4 and the x-axis on the first quadrant with respect to y-axis.
a. 25.6
b. 21.8
c. 31.6
d. 36.4

384. Find the moment of inertia of the area bounded by the curve y^2=4x, the line x=1 and the x-axis on the first quadrant with respect to x-axis.
a. 1.067
b. 1.142
c. 1.861
d. 1.232

385. Find the moment of inertia of the area bounded by the curve y^2=4x, the line x=1 and the x-axis on the first quadrant with respect to y-axis.
a. 0.571
b. 0.682
c. 0.436
d. 0.716

386. Determine the moment of inertia with respect to x-axis of the region in the first quadrant which is bounded by the curve y^2=4x, the line y=2 and y-axis.
a. 1.6
b. 2.3
c. 1.3
d. 1.9

387. Find the moment of inertia of the area bounded by the curve y^2=4x, the line y=2 and the y-axis on the first quadrant with respect to y-axis.
a. 0.095
b. 0.064
c. 0.088
d. 0.076

388. Find the moment of inertia with respect to x-axis of the area bounded by the parabola y^2=4x and the line x=1.

a. 2.35
b. 2.68
c. 2.13
d. 2.56

389. What is the integral of sin^6(φ)cos^4 (φ) dφ if the upper limit is π/2 and lower limit is 0?

a. 0.0184
b. 1.0483
c. 0.1398
d. 0.9237

390. Evaluate the integral of cos^7 φ sin^5 φ dφ if the upper limit is 0.

a. 0.1047
b. 0.0083
c. 1.0387
d. 1.3852

391. What is the integral of sin^4 x dx if the lower limit is 0 and the upper limit is π/2?

a. 1.082
b. 0.927
c. 2.133
d. 0.589

392. Evaluate the integral of cos^5 φ dφ if the lower limit is 0 and the upper limit is π/2.

a. 0.533
b. 0.084
c. 1.203
d. 1.027

393. Evaluate the integral (cos3A)^8 dA from 0 to π/6.

a. 27π/363
b. 35π/768
c. 23π/765
d. 12π/81

394. What is the integral of sin^5 x cos^3 x dx if the lower limit is 0 and the upper limit is π/2?

a. 0.0208
b. 0.0833
c. 0.0278
d. 0.0417

395. Evaluate the integral of 15sin^7 (x) dx from 0 to π/2.

a. 6.857
b. 4.382
c. 5.394
d. 6.139

396. Evaluate the integral of 5 cos^6 x sin^2 x dx if the upper limit is π/2 and the lower limit is 0.

a. 0.307
b. 0.294
c. 0.415
d. 0.186

397. Evaluate the integral of 3(sin x)^3 dx from 0 to π/2.

a. 2
b. π
c. 6
d. π/2

398. A rectangular plate is 4 feet long and 2 feet wide. It is submerged vertically in water with the upper 4 feet parallel and to 3 feet below the surface. Find the magnitude of the resultant force against one side of the plate.

a. 38 w
b. 32 w
c. 27 w
d. 25 w

399. Find the force on one face of a right triangle of sides 4 m, and altitude of 3m. The altitude is submerged vertically with the 4m side in the surface.

a. 58.86 kN
b. 53.22 kN
c. 62.64 kN
d. 66.27 kN

400. A plate in the form of a parabolic segment of base 12m and height of 4m is submerged in water so that the base is in the surface of the liquid. Find the force on the face of the plate.

a. 502.2 kN
b. 510.5 kN
c. 520.6 kN
d. 489.1 kN

401. A circular water main 4 meter in diam. is closed by a bulkhead whose center is 40 m below the surface of the water in the reservoir. Find the force on the bulkhead.

a. 4931 kN
b. 5028 kN
c. 3419 kN
d. 4319 kN

402. A plate in the form of parabolic segment is 12m in height and 4m deep and is partly submerged in water so that its axis is parallel to end 3m below the water surface. Find the force acting on the plate.

a. 993.26 kN
b. 939.46 kN
c. 933.17 kN
d. 899.21 kN

403. A cistern in the form of an inverted right circular cone is 20 m deep and 12 m diameter at the top. If the water is 16 m deep in the cistern, find the work done in Joules in pumping out the water. The water is raised to a point of discharge 10 m above the top cistern.

a. 68166750 Joules
b. 54883992 Joules
c. 61772263 Joules
d. 76177640 Joules

404. A bag containing originally 60 kg of flour is lifted through a vertical distance of 9m. While it is being lifted, flour is leaking from the bag at such rate that the number of pounds lost is proportional to the square root of the distance traversed. If the total loss of flour is 12 kg find the amount of work done in lifting the bag.

a. 4591 Joules
b. 4290 Joules
c. 5338 Joules
d. 6212 Joules

405. According to Hooke's law, the force required to stretch a helical spring is proportional to the distance stretched. The natural length of a given spring is 8 cm. a force of 4kg will stretch it to a total length of 10 cm. Find the work done in stretching it from its natural length to a total length of 16 cm.

a. 6.28 Joules
b. 5.32 Joules
c. 4.65 Joules
d. 7.17 Joules

406. The top of an elliptical conical reservoir is an ellipse with major axis 6m and minor axis 4m. it is 6m deep and full of water. Find the work done in pumping the water to an outlet at the top of the reservoir.

a. 554742 Joules
b. 473725 Joules
c. 493722 Joules
d. 593722 Joules

407. A bag of sand originally weighing 144 kg is lifted at a rate of 3m/min. the sand leaks out uniformly at such rate that half of the sand is lost when the bag has been lifted 18m. find the work done in lifting the bag of sand at this distance.

a. 6351 Joules
b. 4591 Joules
c. 5349 Joules
d. 5017 Joules

408. A cylindrical tank having a radius of 2m and a height of 8m is filled with water at a depth of 6m. Compute the work done in pumping all the liquid out of the top of the container.

a. 3 698 283 Joules
b. 4 233 946 Joules
c. 5 163 948 Joules
d. 2 934 942 Joules

409. A right cylindrical tank of radius 2m and a height 8m is full of water. Find the work done in pumping the tank. Assume water to weigh 9810 N/m^3.

a. 3945 kN . m
b. 4136 kN . m
c. 2846 kN . m
d. 5237 kN . m

410. A conical vessel 12m across the top and 15m deep. If it contains water to a depth of 10m find the work done in pumping the liquid to the top of the vessel.

a. 12 327.5 kN . m
b. 24 216.2 kN . m
c. 14 812.42 kN . m
d. 31 621 kN . m

411. A hemispherical vessel of diameter 8m is full of water. Determine the work done in pumping out the top of the tank in Joules.

a. 326 740 pi
b. 627 840 pi
c. 516 320 pi
d. 418 640 pi

412. A spring with a natural length of 10cm is stretched by 1/2 cm by a Newton force. Find the work done in stretching from 10 cm to 18cm. Express your answer in joules.

a. 7.68 Joules
b. 8.38 Joules
c. 7.13 Joules
d. 6.29 Joules

413. A 5 lb. monkey is attached to a 20 ft hanging rope that weighs 0.3 lb/ft. the monkey climbs the rope up to the top. How much work has it done?

a. 160
b. 170
c. 165
d. 180

414. A bucket weighing 10 Newton when empty is loaded with 90 Newton of sand and lifted at 10 cm at a constant speed. Sand leaks out of a hole in a bucket at a uniform rate and one third of sand is lost by the end of the lifting process in Joules.

a. 850 Joules
b. 900 Joules
c. 950 Joules
d. 800 Joules

415. A conical vessel is 12 m across the top and 15 m deep. If it contains water to a depth of 10m find the work done in pumping the liquid to a height 3m above the top of the vessel.

a. 560pi w N.m
b. 660 pi w N.m
c. 520 pi w N.m
d. 580 pi w N.m

416. A small in the sack of rice cause some rice to be wasted while the sack is being lifted vertically to a height of 30m. The weight lost is proportional to the cube root of distance traversed. If the total loss was 16 kg, find the work done in lifting the said sack of rice which weighs 110kg.

a. 2940 kg.m

b. 2369 kg.m
c. 3108 kg.m
d. 2409 kg.m

417. A hemispherical tank of diameter 20 ft is full of oil weighing 20pcf. The oil is pumped to a height of 10 ft, above the top of the tank by an engine of 1/2 horsepower. How long will it take the engine to empty the tank?

a. 1 hr. 44.72 min
b. 1 hr. 15.47 min
c. 1 hr. 24.27 min
d. 2 hrs.

418. A full tank consists of a hemisphere of radius 4m surmounted by a circular cylinder of the same radius of altitude 8m. Find the work done in pumping the water to an outlet of the top of the tank.

a. (2752/3) pi w
b. (2255/3) pi w
c. (2527/3) pi w
d. (5722/3) pi w

419. Determine the differential equation of a family of lines passing thru (h, k).

a. (y-k) dx – (x-h) dy = 0
b. (x-h) + (y-k) = dy/dx
c. (x-h) dx – (y-k) dy = 0
d. (x+h) dx – (y-k) dy = 0

420. What is the differential equation of the family of parabolas having their vertices at the origin and their foci on the x-axis

a. 2x dy – y dx = 0
b. x dy + y dx = 0
c. 2y dx – x dy = 0
d. dy/dx – x = 0

421. Find the differential equations of the family of lines passing through the origin.

a. ydx – xdy = 0
b. xdy – ydx = 0
c. xdx + ydy = 0
d. ydx + xdy = 0

422. The radius of the moon is 1080 miles. The gravitation acceleration of the moons surface is 0.165 miles the gravitational acceleration at the earth's surface. What is the velocity of escape from the moon in miles per second?

a. 2.38
b. 1.47
c. 3.52
d. 4.26

423. Find the equation of the curve at every point of which the tangent line has a slope of 2x.

a. x = -y^2 + C
b. y = -x^2 + C
c. x = y^2 + C
d. y = x^2 + C

424. The radius of the earth is 3960 miles. If the gravitational acceleration of earth surface is 31.16 ft/sec^2, what is the velocity of escape from the earth in miles/sec?

a. 6.9455
b. 5.4244
c. 3.9266
d. 7.1842

425. Find the velocity of escape of the Apollo spaceship as it is projected from the earth's surface that is the minimum velocity imparted to it so that it will never return. The radius of the earth is 400 miles and the acceleration of the spaceship is 32.2 ft/sec^2.

a. 40478 kph
b. 50236 kph
c. 30426 kph
d. 60426 kph

426. The rate of population growth of a country is proportional to the number of inhabitants. If a population of a country now is 40 million and expected to double in 25 years, in how many years is the population be 3 times the present?

a. 39.62 yrs.
b. 28.62 yrs.
c. 18.64 yrs.
d. 41.2 yrs.

427. From the given differential equation xdx+6y^5dy = 0 solve for the constant of integration when x = 0, y = 2.

a. $27x\,dx + 4y^2\,dy = 0$
b. 58
c. 48
d. 64

428. Find the equation of the curve which passes through points (1, 4) and (0, 2) if $d^2y/dx^2 = 1$

a. $2y = x^2 + 3x + 4$
b. $4y = 2x^2 + x + 4$
c. $5y = x^2 + 2x + 2$
d. $3y = x^2 + x + 4$

429. The rate of population growth of a country is proportional to the number of inhabitants. If a population of a country now is 40 million and 50 million in 10 years time, what will be its population 20years from now?
a. 56.19
b. 71.29
c. 62.18
d. 59.24

430. The Bureau of Census record in 1980 shows that the population in the country doubles compared to that of 1960. In what year will the population trebles assuming that the rate of increase in the population is proportional to the population?

a. 34.60
b. 31.70
c. 45.65
d. 38.45

431. A tank contains 200 liters of fresh water. Brine containing 2 kg/liter of salt enters the tank at the rate of 4 liters per min, and the mixture kept uniform by stirring, runs out at 3 liters per min. Find the amount of salt in the tank after 30 min.

a. 196.99 kg
b. 186.50 kg
c. 312.69 kg
d. 234.28 kg

432. In a tank are 100 liters of brine containing 50 kg total of dissolved salt. Pure water is allowed to run into the tank at the rate of 3 liters per minute. Brine runs out of the tank at rate of 2 liters per minute. The instantaneous concentration in the tank is kept uniform by stirring. How much salt is in the tank at the end of 1 hour?

a. 20.50
b. 18.63

c. 19.53
d. 22.40

433. Determine the general solution of xdy + ydx=0.

a. xy = c
b. ln xy = c
c. ln x + ln y = c
d. x + y = c

434. The inverse laplace transform of s/[(square) + (w square)] is:

a. sin wt
b. w
c. (e exponent wt)
d. cos st

435. The laplace transform of cos wt is:

a. s/[(square) + (w square)]
b. w/[(square) + (w square)]
c. w/s + w
d. s/s + w

436. K divided by [(s square) + (k square)] is inverse laplace transform of:

a. cos kt
b. sin kt
c. (e exponent Ky)
d. 1.0

437. Find the inverse transform of [2/(s+1)] – [(4/(s+3)] is equal to:

a. [2 e (exp – t) – 4e (exp – 3t)]
b. [e (exp – 2t) + e (exp – 3t)]
c. [e (exp – 2t) – e (exp - 3t)]
d. [2e (exp – t) – 2e (exp - 2t)]

438. What is the laplace transform of e^(-4t)

a. 1/ (s + 1)
b. 1/ (s + 4)
c. 1/ (s – 4)
d. 1/ (s + t)

439. Determine the laplace transform of I(S) = 200 / [(s^2) + 50s + 10625]

a. I(S) = 2e^(-25t) sin100t
b. I(S) = 2te^(-25t) sin100t
c. I(S) = 2e^(-25t) cos100t
d. I(S) = 2te^(-25t) cos100t

440. Determine the inverse laplace transform of (s+a) / [(s+a) ^2 + w^2]

a. e^(-at) sin wt
b. te^(-at) cos wt
c. t sin wt
d. e^(-at) cos wt

441. Determine the inverse laplace transform of 100/ [(S+10) (S+20)]

a. 10e^(-10t) – 20e^(-20t)
b. 10e^(-10t) + 20e^(-20t)
c. 10e^(-10t) – 10e^(-20t)
d. 20e^(-10t) + 10e^(-20t)

442. A thin heavy uniform iron rod 16m long is bent at the 10 m mark forming a right angle L – shaped piece 6m by 10m of bend. What angle does the 10m side make with the vertical when the system is in equilibrium?

a. 28° 12'
b. 19° 48'
c. 24° 36'
d. 26° 14'

443. Three men carry a uniform timber. One takes hold at one end and the other two carry by means of a crossbar placed underneath. At what point of timber must the bar be placed so that each man may carry one third of the weight of the weight of the timber? The timber has a length of 12 m.

a. 4m
b. 5m
c. 2.5 m
d. 3m

444. A painters scaffold 30m long and a mass of 300 kg, is supported in a horizontal position by a vertical ropes attached at equal distances from the ends of the scaffold. Find the greatest distance from the ends that the ropes may be attached so as to permit a 200 kg man to stand safely at one end of scaffold.

a. 8m
b. 7m

c. 6m
d. 9m

445. A cylindrical tank having a diameter of 16 cm weighing 100 kN is resting on a horizontal floor. A block having a height of 4 cm is placed on the side of the cylindrical tank to prevent it from rolling. What horizontal force must be applied at the top of the cylindrical tank so that it will start to roll over the block? Assume the block will not slide and is firmly attached to the horizontal floor.

a. 68.36 kN
b. 75.42 kN
c. 58.36 kN
d. 57.74 kN

446. Two identical sphere weighing 100 kN are each place in a container such that the lower sphere will be resting on a vertical wall and a horizontal wall and the other sphere will be resting on the lower sphere and a wall making an angle of 60 degrees with the horizontal. The line connecting the two centers of the spheres makes an angle of 30 degrees with the horizontal surface. Determine the reaction between the contact of the two spheres. Assume the walls to be frictionless.

a. 150
b. 120
c. 180
d. 100

447. The 5 m uniform steel beam has a mass of 600 kg and is to be lifted from the ring B with two chains, AB of length 3m, and CB of length 4m. Determine the tension T in chain AB when the beam is clear of the platform.

a. 2.47 kN
b. 3.68 kN
c. 5.42 kN
d. 4.52 kN

448. A man attempts to support a stack of books horizontally by applying a compressive force of F=120 N to the ends of the stack with his hands, determine the number of books that can be supported in the stack if the coefficient of friction between any two books is 0.40.

a. 15 books
b. 20 books
c. 10 books
d. 12 books

449. Two men are just to lift a 300 kg weight of crowbar when the fulcrum for this lever is 0.3m from the weight and the man exerts their strengths at 0.9 m and 1.5 m respectively from the fulcrum. If the men interchange positions, they can raise a 340 kg weight. What force does each man exert?

a. 25 kg, 40 kg
b. 35 kg, 45 kg
c. 40 kg, 50 kg
d. 30 kg, 50 kg

450. A man exert a maximum pull of 1000 N but wishes to lift a new stone door for his cave weighing 20 000 N. if he uses lever how much closer must the fulcrum be to the stone than to his hand?

a. 10 times nearer
b. 20 times farther
c. 10 times farther
d. 20 times nearer

451. A simple beam having a span of 6m has a weight of 20 kN/m. It carries a concentrated load of 20 kN at the left end and 40 kN at 2m from the right end of the beam. If it is supported at 2m from the left end and the right end, compute the reaction at the right end of the beam.

a. 40 kN
b. 20 kN
c. 50 kN
d. 30 kN

452. When one boy is sitting 1.20 m from the center of a seesaw another boy must sit on the other side 1.50 m from the center to maintain an even balance. However, when the first boy carries an additional weight of 14 kg and sit 1.80 m from the center, the second boy must move 3m from the center to balance, Neglecting the weight of the see weight of the heaviest boy.

a. 42 kg
b. 35 kg
c. 58 kg
d. 29 kg

453. A wire connects a middle of links AC and AB compute the tension in the wire if AC carries a uniform load of 600 N/m. AC is 4.5 m long and BC is 7.5 m. point A is hinged on the wall and joint C is also hinged connecting the links AC and CB. AC is horizontal while B is supported by roller acting on the wall AB.

a. 2700 N

b. 3600 N
c. 300 N
d. 2200 N

454. An airtight closed box of weight P is suspended from a spring balance. A bird of weight W is place on the floor of the bow, and the balance reads W + P. If the bird flies without accelerating. What is the balance reading?

a. P + W
b. P
c. P – W
d. P + 2W

455. A tripod whose legs are each 4 meters long supports a load of 1000 kg. the feet of the tripod are at the vertices of a horizontal equilateral triangle whose side are 3.5 meters. Determine the load of each leg.
a. 386.19 kg
b. 347.29 kg
c. 214.69 kg
d. 446.27 kg

456. A uniform square table top ABCD having sides 4m long is supported by three vertical supports at A, E and F, E is midway n the side BC and F is 1m from D along the side DC. Determine the share of load in percent carried by supports at A, E and F.

a. A = 29%, E = 42%, F = 29%
b. A = 32%, E = 46%, F = 20%
c. A = 28%, E = 40%, F = 32%
d. A = 36%, E = 32%, F = 32%

457. The square steel plate has a mass of 1800 kg with mass at its center G. Calculate the tension at each of the three cables with which the plate is lifted while remaining horizontal.

a. Ta = Tb = 6.23 kN, Tc = 10.47 kN
b. Ta = Tb = 7.47 kN, Tc = 7.84 kN
c. Ta = Tb = 5.41 kN, Tc = 9.87 kN
d. Ta = Tb = 4.42 kN, Tc = 6.27 kN

458. A horizontal Circular platform of radius R is supported at three points A, B and C on its circumference. A and B are 90 degrees apart and C is 120 degrees from A. The platform carries a vertical load of 400 kN at its center and 100 kN at a point d on the circumference diametrically opposite A. Compute the reaction at C.

a. 253.45 kN
b. 321.23 kN

c. 310.10 kN
d. 287.67 kN

459. A ladder 4m long having a mass of 15kg is resting against a floor and an wall for which the coefficients of static friction are 0.30 for the floor to which a man having a mass of 70 kg can climb without causing the plank to slip if the plank makes an angle of 40 degrees with the horizontal.

a. 2
b. 1
c. 2.5
d. 3

460. A homogenous block having dimension of 4cm by 8cm is resting on an inclined plane making an angle of θ with the horizontal. The block has a weight of 20 kN. If the coefficient of friction between the block and the inclined plane is 0.55, find the value of θ before the block starts to move. The 8cm side is perpendicular to the inclined plane.

a. 26.57°
b. 28.81°
c. 27.7°
d. 23.4°

461. A uniform ladder on a wall at A and at the floor at B. Point A is 3.6m above the floor and point B is 1.5m away from the wall. Determine the minimum coefficient of friction at B required for a mass weighing 65 kg to use the ladder assuming that there is no friction at A.

a. 0.42
b. 0.50
c. 0.48
d. 0.54

462. A block having a mass of 250 kg is placed on top of an inclined plane having a slope of 3 vertical to 4 horizontal. If the coefficient of friction between the block and the inclined plane is 0.15, determine the force P that may be applied parallel to the inclined plane to keep block from sliding down the plane.

a. 1177.2 N
b. 1088.2 N
c. 980.86 N
d. 1205.30 N

463. A 3.6 m ladder weighing 180 N is resting on a horizontal floor at A and on the wall at B making an angle of 30 degrees from the vertical wall. When a man weighing 800 N reaches a point 2.4m from the lower end (point A), the ladder is just about to slip.

Determine the coefficient of friction between the ladder and the floor if the coefficient of friction between the ladder and the wall is 0.20.

a. 0.35
b. 0.42
c. 0.28
d. 0.56

464. A dockworker adjusts a spring line (rope) which keeps the ship from drifting along side a wharf. If he exerts a pull of 200N on the rope, which ahs 1 ¼ turns around the mooring bit, what force T can he support? The coefficient of friction between the rope and the cast-steel mooring bit is 0.30.

a. 2110 N
b. 1860 N
c. 155 N
d. 142 N

465. Determine the distance "x" to which the 90 kg painter can climb without causing the 4m ladder to slip at its lower end A. The top of the 15 kg ladder has a small roller, and the ground coefficient of static friction is 0.25. the lower end of the ladder is 1.5 m away from the wall.

a. 2.55 m
b. 3.17 m
c. 1.58 m
d. 0.1 m

466. The uniform pole of length 4m and mass 100kg is leaned against a vertical wall. If the coefficient of static friction between the supporting surfaces and the ends of the poles is 0.25, calculate the maximum angle θ at which the pole may be placed with the vertical wall before it starts to slip.

a. 28.07°
b. 26.57°
c. 31.6°
d. 33.5°

467. A horizontal force P acts on the top of a 30 kg block having a width of 25 cm, and a height of 50cm. if the coefficient of friction between the block and the plane is 0.33, what is the value of P for motion to impend?

a. 7.5 kg
b. 5.3 kg
c. 6.6 kg
d. 8.2 kg

468. A 600 N block rests on a 30° plane. If the coefficient of static friction is 0.30 and the coefficient of kinetic friction is 0.20, what is the value of P applied horizontally to prevent the block from sliding down the plane?

a. 141.85 N
b. 183.29 N
c. 119.27 N
d. 126.59 N

469. A 600 N block rests on a 30° plane. If the coefficient of static friction is 0.30 and the coefficient of kinetic friction is 0.20, what is the value of P applied horizontally to keep the block moving up the plane?

a. 527.31 N
b. 569.29 N
c. 427.46 N
d. 624.17 N

470. Solve for the force P to obtain equilibrium. Angle of friction is 25° between block and the inclined plane.

a. 96.46 kg
b. 77.65 kg
c. 69.38 kg
d. 84.22 kg

471. A 200 kg crate impends to slide down a ramp inclined at an angle of 19.29° with the horizontal. What is the frictional resistance? Use g = 9.81 m/s^2.

a. 648.16 N
b. 638.15 N
c. 618.15 N
d. 628.15 N

472. A 40kg block is resting on an inclined plane making an angle of 20° from the horizontal. If the coefficient of friction is 0.60, determine the force parallel to the incline that must be applied to cause impending motion down the plane. Use g = 9.81

a. 87 N
b. 82 N
c. 72 N
d. 77 N

473. A 40 kg block is resting on an inclined plane making an angle of θ from the horizontal. Coefficient of friction is 0.60, find the value of θ when force P = 36.23 is applied to cause the motion upward along the plane.

a. 20°
b. 30°
c. 28°
d. 23°

474. A 40 kg block is resting on an inclined plane making an angle θ from the horizontal. The block is subjected to a force 87N parallel to the inclined plane which causes an impending motion down the plane. If the coefficient of motion is 0.60, compute the value of θ.

a. 20°
b. 30°
c. 28°
d. 23°

475. A rectangular block having a width of 8cm and height of 20 cm, is reating on a horizontal plane. If the coefficient of friction between he horizontal plane and the block is 0.40, at what point above the horizontal plane should horizontal force P will be applied at which tipping will occur?

a. 10 cm
b. 14 cm
c. 12 cm
d. 8 cm

476. A ladder is resting on a horizontal plane and a vertical wall. If the coefficient of friction between the ladder, the horizontal plane and the vertical wall is 0.40, determine the angle that the ladder makes with the horizontal at which it is about to slip.

a. 46.4°
b. 33.6°
c. 53.13°
d. 64.13°

477. Three identical blocks A, B and C are placed on top of each other are place on a horizontal plane with block B on top of A and C on top of B. The coefficient of friction between all surfaces is 0.20. if block C is prevented from moving by a horizontal cable attached to a vertical wall, find the horizontal force in Newton that must be applied to B without causing motion to impend. Each block has a mass of 50kg.

a. 294.3 Newtons
b. 274.7 Newtons

c. 321.3 Newtons
d. 280.5 Newtons

478. A car moving downward on an inclined plane which makes an angle of θ from the horizontal. The distance from the front wheel to the rear wheel is 400cm and its centroid is located at 50 cm from the surface of the plane. If only rear wheels provide breaking, what is the value of θ so that the car will start to slide if the coefficient of friction is 0.6?

a. 15.6°
b. 18.4°
c. 16.8°
d. 17.4°

479. A 40kg block is resting on an inclined plane making an angle of 20° from the horizontal. If the coefficient of friction is 0.60, determine the force parallel to the inclined plane that must be applied to cause impending motion up the plane.

a. 355.42 N
b. 354.65 N
c. 439.35 N
d. 433.23 N

480. A block weighing 40 kg is placed on an inclined plane making an angle of θ from th horizontal. If the coefficient of friction between the block and the inclined plane is 0.30, find the value of θ, when the block impends to slide downward.

a. 16.70°
b. 13.60°
c. 15.80°
d. 14.50°

481. A block having a weight W is resting on an inclined plane making an angle of 30° from the horizontal. If the coefficient of friction between the block and the inclined plane is 0.50. Determine the value of W is a force 300 N applied parallel to the inclined plane to cause an impending motion upward.

a. 321.54 N
b. 493.53 N
c. 450.32 N
d. 354.53 N

482. 40kg block is resting on an inclined plane making an angle of 20° from the horizontal. The block is subjected to a force 87 N parallel to the inclined plane which causes an impending motion down the plane. Compute the coefficient of friction between the block and the inclined plane.

a. 0.60
b. 0.80
c. 0.70
d. 0.50

483. A 20kg cubical block is resting on an inclined plane making an angle of 30° with the horizontal. If the coefficient of friction between the block and the inclined plane is 0.30, what force applied at the uppermost section which is parallel to the inclined plane will cause the 20kg block to move up?

a. 134 N
b. 130 N
c. 146 N
d. 154 N

484. The coefficient of friction between the 60 kN block is to remain in equilibrium, what is the maximum allowable magnitude for the force P?

a. 15 kN
b. 12 kN
c. 18 kN
d. 24 kN

485. Find the value of P acting to the left that is required to pull the wedge out under the 500kg block. Angle of friction is 20° for all contact surfaces.

a. 253.80 kg
b. 242.49 kg
c. 432.20 kg
d. 120.50 kg

486. The accurate alignment of a heavy duty engine on its bed is accomplished by a screw adjusted wedge with a 20° taper as shown in the figure. Determine the horizontal thrust P in adjusting screw necessary to raise the mounting if the wedge supports one fourth of the total engine weight of 20 000N. The total coefficient of friction for all surfaces is 0.25.

a. 4640 N
b. 4550 N
c. 5460 N
d. 6540 N

487. Two blocks connected by a horizontal link AB are supported on two rough planes as shown. The coefficient of friction for block A on the horizontal plane is 0.40. the angle of friction for block B on the inclined plane is 15°. What is the smallest weight of block A for which equilibrium of the system can exists?

a. 1000 kN
b. 1500 kN
c. 2000 kN
d. 500 kN

488. Is the system in equilibrium? If not, find the force P so that the system will be in equilibrium.

a. 80 kg
b. 90 kg
c. 100 kg
d. 70 kg

489. A 12 kg block of steel is at rest on a horizontal cable. The coefficient of static friction between the block a table is 0.52. What is the magnitude of the force acting upward 62° from the horizontal that will just start the block moving?

a. 65.9 N
b. 78.1 N
c. 70.2 N
d. 72.4 N

490. The pull required to overcome the rolling resistance of a wheel is 90 N acting at the c enter of the wheels. If the weight of the wheel is 18 000 N and the diameter of the wheel is 300mm, determine the coefficient of rolling resistance.

a. 0.60 mm
b. 0.75 mm
c. 0.50 mm
d. 0.45 mm

491. A 1000 kN weight is to be moved by using 50 mm diameter rollers. If the coefficient of the rolling resistance for the rollers and floor is 0.08 mm and that for rollers and weight is 0.02 mm. determine the pull required.

a. 2000 N
b. 1500 N
c. 2500 N
d. 1000 N

492. A ball is thrown vertically upward with an initial velocity of 3m/sec from a window of a tall building. The ball strikes at the sidewalk at ground level 4 sec later. Determine the velocity with which the ball hits the ground.

a. 30.86 m/sec

b. 36.24 m/sec
c. 42.68 m/sec
d. 25.27 m/sec

493. A train starts from rest at station P and stops from station Q which is 10km from station P. the maximum possible acceleration of the train is 15km/hour/min. if the maximum allowable speed is 60 kph, what is the least time the train go from P to Q?

a. 15 min
b. 10 min
c. 12 min
d. 20 min

494. A car starting from rest picks up at a uniform rate and passes three electric post in succession. The posts are spaced 360 m apart along a straight road. The car takes 10sec to travel from first post to sec post and takes 6 sec to go from the second to the third post. Determine the distance from the starting point to the first post.

a. 73.5 m
b. 80.3 m
c. 77.5 m
d. 70.9 m

495. A stone is dropped from the deck of Mactan Bridge. The sound of the splash reaches the deck 3 seconds later. If sound travels 342 m/s in still air, how high is the deck of Mactan Bridge above the water?

a. 40.6 m
b. 45.2 m
c. 57.3 m
d. 33.1 m

496. At a uniform rate of 4 drops per second, water is dripping from a faucet. Assuming the acceleration of each drop to be 9.81 m/sec^2 and no air resistance, find the distance between two successive drops in mm if the upper drop has been in motion for 3/8 seconds.

a. 1230 mm
b. 2340 mm
c. 2231 mm
d. 1340 mm

497. A racing car during the Marlboro Championship starts from rest and has a constant acceleration of 4m/sec^2. What is its average velocity during the first 5 seconds of motion?

a. 10 m/s
b. 4 m/s
c. 6 m/s
d. 12 m/s

498. A train is to commute between Tutuban station and San Andres station with a top speed of 250 kph but can not accelerate nor decelerate faster than 4 m/s. What is its min. distance between the two stations in order for the train to be able to reach its top speed?

a. 1106.24
b. 1205.48
c. 1309.26
d. 1026.42

499. A block having a weight of 400N rests on an inclined plane making an angle of 30° with the horizontal is initially at rest after it was released for 3 sec, find the distance the block has traveled assuming there is no friction between the block and plane. Determine the velocity after 3 seconds.

a. 14.71 m/sec
b. 15.39 m/sec
c. 14.60 m/sec
d. 13.68 m/sec

500. A car accelerates for 6 sec from an initial velocity of 10 m/s. the acceleration is increasing uniformly from zero to 8 m/s^2 in 6 sec. during the next 2 seconds, the car decelerates at a constant rate of m/s^2. Compute the total distance the car has traveled from the start after 8 sec.

a. 169 m
b. 172 m
c. 180 m
d. 200 m

501. A train passing at point A at a speed of 72 khp accelerates at 0.75 m/s^2 from one minute along a straight path then decelerates at 1.0 m/s^2. How far from point a will be 2min after passing point A.

a. 6.49 km
b. 7.30 km
c. 4.65 km
d. 3.60 km

502. A car accelerate 8 seconds from rest, the acceleration increasing uniformly from zero to 12 m/s^2. During the next 4 sec, the car decelerates at a constant rate of -11 m/s^2. Compute the distance the car has traveled after 12 sec from the start.

a. 232 m
b. 240 m
c. 302 m
d. 321 m

503. A car moving at 6 m/s accelerates at 1.5 m/s^2 for 15 sec, then decelerates at a rate of 1.2 m/s^2 for 12 sec. Determine the total distance traveled.

a. 558.75 m
b. 543.80 m
c. 384.90 m
d. 433.75 m

504. A train starting at initial velocity of 30 kph travels a distance 21 km in 8 min. determine the acceleration of the train at this instant.

a. 0.0865 m/s^2
b. 0.0206 m/s^2
c. 0.3820 m/s^2
d. 0.0043 m/s^2

505. From a speed of 75 kph, a car decelerates at the rate of 500 m/min^2 along a straight path. How far in meters will it travel in 45 sec?

a. 790.293 m
b. 791.357 m
c. 796.875 m
d. 793.328 m

506. An object experiences rectilinear acceleration a(t)= 10 – 2t. How far does it travel in 6 sec if its initial velocity is 10 m/s?

a. 182
b. 168
c. 174
d. 154

507. An object experiences the velocity as shown in the diagram. How far will it move in 6 seconds?

a. 40 m
b. 60 m
c. 80 m
d. 100 m

508. An object is accelerating to the right along a straight path at 2m/s. the object begins with a velocity 10 m/s to the left. How far does it travel in 15 seconds?

a. 125 m
b. 130 m
c. 140 m
d. 100 m

509. What is the acceleration of a body that increases in velocity from 20 m/s to 40 m/s in 3 sec?
Answer in SI.

a. 8.00 m/s^2
b. 6.67 m/s^2
c. 50. m/s^2
d. 7.0 m/s^2

510. A shell is fired vertically upward with an initial velocity of 2000 fps. It is timed to burst in 7 sec. Four seconds after firing the first shell, a second shell is fired with the same velocity. This shell is time to burst in 5 sec. An observer stationed in a captive balloon near the line of fire hears both burst. At the same instance what is the elevation or height of the balloon. Assume velocity of sound to be 1100 fps.

a. 10 304 ft
b. 18 930 ft
c. 13 400 ft
d. 14 030 ft

511. An object from a height of 92 m and strikes the ground with a speed of 19 m/s. Determine the height that the object must fall in order to strike with a speed of 24 m/s.

a. 146.94 m
b. 184.29 m
c. 110.12 m
d. 205.32 m

512. A ball is dropped from a balloon at a height of 195 m. if the balloon is rising 29.3 m/s. Find the highest point reached by the ball and the time of flight.

a. 238.8 m
b. 487.3 m
c. 328.4 m
d. 297.3 m

513. A ball is thrown vertically upward with an initial velocity of 3m/sec from a window of a tall building. The ball strikes at the sidewalk at ground level 4 sec later. Determine

the velocity with which the ball hits the ground and the height of the window above the ground level.

a. 36.2 m/s; 66.79 m
b. 24.4 m/s; 81.3 m
c. 42.3 m/s; 48.2 m
d. 53.2 m/s; 36.8 m

514. A ball is dropped freely from a balloon at a height 195 m. If the balloon is rising 29.3 m/s. Find the highest point reached by the ball and the velocity of the ball as it strikes the ground.

a. 43.76 m; 68.44 m/s
b. 22.46 m; 71.66 m/s
c. 36.24 m; 69.24m/s
d. 12.8 m; 31.2 m/s

515. How far does the automobile move while its speed increases uniformly from 15 kph to 45 kph in 20 sec?

a. 185 m
b. 167 m
c. 200 m
d. 172 m

516. An automobile is moving at 20 kph and accelerates at 0.5 m/s^2 for a peroiud of 45 sec. Compute the distance traveled by the car at the end of 45 sec.

a. 842.62 m
b. 765.45 m
c. 672.48 m
d. 585.82 m

517. A ball is thrown vertically upward with an initial velocity of 3m/sec from a window of a tall building, which is 70 m above the ground level. How long will it take for the ball to hit the ground?

a. 3.8 sec
b. 4.1 sec
c. 5.2 sec
d. 6.1 sec

518. A ball is thrown vertically upward with an initial velocity of 3m/sec from a window of a tall building. The ball strikes the ground 4 sec later. Determine the height of the window above the ground.

a. 66.331 m
b. 67.239 m
c. 54.346 m
d. 72.354 m

519. A stone was dropped freely from a balloon at a height of 190m above the ground. The balloon is moving upward at a speed of 30 m/s. Determine the velocity of the stone at it hits the ground.

a. 56.43 m/s
b. 68.03 m/s
c. 62.45 m/s
d. 76.76 m/s

520. A ball is thrown vertically at a speed of 20 m/s from a building 100 m above the ground. Find the velocity and the position of the ball above the ground after 5 seconds.

a. 3.34 m, 45.23 m/s
b. 4.54 m, 47.68 m/s
c. 5.67 m, 56.42 m/s
d. 6.23 m, 34.76 m/s

521. A ball is thrown vertically at a speed of 30 m/s from a building 200 m above the ground. Determine the velocity and the time that it strikes the ground.

a. 11.50 sec, 65.80 m/s
b. 11.45 sec, 66.59 m/s
c. 10.30 sec, 67.21 m/s
d. 10.14 sec, 69.45 m/s

522. A ball is thrown vertically with a velocity of 20 m/s from the top of a building 100m high. Find the velocity of the ball at a height of 40 m above the ground.

a. 39.71 m/s
b. 40.23 m/s
c. 39.88 m/s
d. 39.68 m/s

523. A ball is shot at a ground level at an angle of 60 degrees with the horizontal with an initial velocity of 100 m/s. Determine the height of the ball after 2 seconds.

a. 162.46 m
b. 153.59 m
c. 175.48 m
d. 186.42 m

524. A ball is shot at an average speed of 200 m/s at an angle of 20° with the horizontal. What would be the velocity of the ball after 8 seconds?

a. 188.21 m/s
b. 154.34 m/s
c. 215.53 m/s
d. 198.37 m/s

525. A projectile has a velocity of 200 m/s acting at an angle 20 degrees with the horizontal. How long will it take for the projectile to hit the ground surface?

a. 13.95 sec
b. 15.75 sec
c. 10.11 sec
d. 24.23 sec

526. A solid homogenous circular cylinder and a solid homogenous sphere are placed at equal distances from the end of an inclined plane. Assuming that no slipping occurs as the two bodies roll down the plane, which of them will reach the end of the plane first? Assume that they have the same weight and radius.

a. sphere
b. cylinder
c. both cylinder and sphere
d. none of these

527. A homogenous sphere rolls down as inclined plane making an angle of 30° with the horizontal. Determine the minimum value of the coefficient of friction which will prevent slipping.

a. 0.165
b. 0.362
c. 1.028
d. 0.625

528. At what weight "h" above the billiard table surface should a billiard ball of radius 3cm be struck by a horizontal impact in order that the ball will start moving with no friction between the ball and the table?

a. 4.9 cm
b. 3.4 cm
c. 4.2 cm
d. 5.5 cm

529. A common swing 7.5 m high is designed for a static load of 1500 N (tension in the rope is equal to 1500 N). Two boys each weighing 500 N are swinging on it. How much

many degrees on each side of the vertical can they swing without exceeding the designed load?

a. 41.41°
b. 45.45°
c. 30.35°
d. 54.26°

530. A wooden block weighing 20N rests on a turn table having a radius of 2m at a distance on 1m from the center. The coefficient of friction between the block and the turn table is 0.30. The rotation of the table is governed by the equation Ø = 4t^2 where Ø is in radians and t in seconds. If the table starts rotating from rest at t=0, determine the time elapsed before the block will begin to slip.

a. 0.21 sec
b. 0.55 sec
c. 1.05 sec
d. 0.10 sec

531. A ball at the end of a cord 121 cm long is swinging with a complete vertical circle just enough velocity to keep it in the top. If the ball is released from the cord where it is at the top point of its path, where will it strike the ground 245 cm below the center of the circle.

a. 297.61 cm
b. 332.64 cm
c. 258.37 cm
d. 263.63 cm

532. At what RPM is the ferriswheel turning when the riders feel "weightless" or zero gravity every time the each rider is at the topmost part of the wheel 9m in radius?

a. 9.97 rpm
b. 8.58 rpm
c. 10.73 rpm
d. 9.15 rpm

533. A wooden block having a weight of 50 N is placed at a distance 1.5m from the center of a circular platform rotating at a speed of 2 radians per second. Determine the minimum coefficient of friction of the blocks so that it will not slide. Radius of circular platform is 3m.

a. 0.61
b. 0.84
c. 0.21
d. 1.03

534. A 2N weight is swing in a vertical circle of 1m radius and the end of the cable will break if the tension exceeds 500 N. Which of the following most nearly gives the angular velocity of the weight when the cable breaks?

a. 49.4 rad/sec
b. 37.2 rad/sec
c. 24.9 rad/sec
d. 58.3 rad/sec

535. A weight is attached to a chord and forms a conical pendulum when it is rotated about the vertical axis. If the period of rotation is 0.2 sec, determine the velocity of the weight if the chord makes an angle of 25° with the vertical.

a. 0.146 m/s
b. 0.823 m/s
c. 1.028 m/s
d. 0.427 m/s

536. A ball having a weight of 4N is attached to a cord 1.2 m long and is revolving around a vertical axis so that the cord makes an angle of 20° with the vertical axis. Determine the rpm.

a. 28.17
b. 24.16
c. 22.12
d. 25.18

537. A wheel is rotating at 4000 rpm. If it experience a deceleration of 20 rad/sec^2 through how many revolutions will it rotate before it stops?

a. 400
b. 698
c. 520
d. 720

538. Find the maximum acceleration of a mass at the end of a 2m long string. It swing like a pendulum with a maximum angle of 30°.

a. 4.91 m/s^2
b. 3.61 m/s^2
c. 6.21 m/s^2
d. 7.21 m/s^2

539. A turbine started from rest to 180 rpm in 6 min at a constant acceleration. Find the number of revolution that it makes within the elapsed time.

a. 550 revolutions
b. 540 revolutions
c. 630 revolutions
d. 500 revolutions

540. Traffic travels at 65 mph around banked highway curved with a radius of 3000 feet. What banking angle is necessary such that friction will not be required to resist the centrifugal force?

a. 3.2°
b. 2.5°
c. 5.4°
d. 18°

541. The rated speed of a highway curve of 60m radius of 50 kph. If the coefficient of friction between the tires and the road is 0.60, what is the maximum speed at which a car can round a curve without skidding?

a. 93.6 kph
b. 84.2 kph
c. 80.5 kph
d. 105.2 kph

542. A solid disk flywheel (I = 200 kg.m) is rotating with a speed of 900 rpm. What is the rotational kinetic energy?

a. 730 x 10^3 J
b. 680 x 10^3 J
c. 888 x 10^3 J
d. 1100 x 10^3 J

543. A cyclist on a circular track of radius r = 800ft travelling at 27 ft/s. His speed at the tangential direction increases at the rate of 3 ft/s^2. What is the cyclist's total acceleration?

a. 2.8 ft/s^2
b. -3.12 ft/s^2
c. -5.1 ft/s^2
d. 3.31 ft/s^2

544. An automobile travels on a perfectly horizontal, unbanked circular track of radius R. The coefficient of friction between the tires and the track is 0.3. If the car's velocity is 15 m/s, what is the smallest radius it may travel without skidding?

a. 68m

b. 69.4 m
c. 76.5 m
d. 71.6 m

545. Determine the angle of super elevation for a highway curves of 183 m radius, so that there will be no “slide thrust” for a speed of 72 kilometer per hour. At what speed will skidding impend if the coefficient of friction is 0.3?

a. 12.57°; 31.72 m/s
b. 13.58°; 25.49 m/s
c. 15.29°; 34.24 m/s
d. 10.33°; 30.57 m/s

546. A child places a picnic basket on the outer rim of merry go round that has a radius of 4.6m and revolves once every 24 sec. How large must the coefficient of static friction be for the basket to stay on the merry go round?

a. 0.032
b. 0.024
c. 0.045
d. 0.052

547. A driver’s manual that a driver traveling at 48kph and desiring to stop as quickly as possible travels 4m before the foot reaches the brake. The car travels and additional 21 m before coming to rest. What coefficient of friction is assumed in this calculation?

a. 0.43
b. 0.34
c. 0.56
d. 0.51

548. A point on the rim of a rotating flywheel changes its speed its speed from 1.5m/s to 9 m/s while it moves 60 m. If the radius of the wheel is 1m, compute the normal acceleration at the instant when its speed is 6m/s.

a. 36 m/s^2
b. 24 m/s^2
c. 18 m/s^2
d. 20 m/s^2

549. The angular speed of a rotating flywheel a radius of 0.5m, is 180/π rpm. Compute the value of its normal acceleration and the tangential speed.

a. 16 m/s^2; 2 m/s
b. 18 m/s^2; 3 m/s
c. 14 m/s^2; 1.5 m/s

d. 12 m/s^2; 1.0 m/s

550. A pulley has an angular velocity of 2 rad/sec, and a tangential speed of 4 m/s. Compute the normal acceleration.

a. 8 m/sec^2
b. 6 m/sec^2
c. 4 m/sec^2
d. 3 m/sec^2

551. A 10.7 kN car travelling at 134 m/s attempts to round an unbanked curve with a radius of 61 m. What force of friction is required to keep the car on its circular path?

a. 3211 N
b. 3445 N
c. 3123 N
d. 4434 N

552. A rotating wheel has a radius of 2 feet and 6 inches. A point on the rim of the wheel moves 30ft in 2sec. Find the angular velocity of the wheel.

a. 6 rad/sec
b. 2 rad/sec
c. 4 rad/sec
d. 5 rad/sec

553. A prismatic AB bar 6m long has a weight of 500 N. It is pin connected at one end at A. If it is rotated about a vertical axis at Ai how fast would it be rotated when it makes an angle of 30° with the vertical?

a. 1.68 rad/sec
b. 2.58 rad/sec
c. 1.22 rad/sec
d. 2.21 rad/sec

554. A prismatic bar weighing 25 kg is rotated horizontally about one of its ends at a speed of 2.5 rad/sec. Compute the length of the prismatic bar when it makes an angle of 45° with the vertical.

a. 6.5 m
b. 3.33 m
c. 6.20 m
d. 7.35 m

555. A bullet enters a 50 mm plank with a speed of 600 m/s and leaves with a speed of 24 m/s. Determine the thickness of the plank that can be penetrated by the bullet.

a. 55 mm
b. 60 mm
c. 65 mm
d. 70 mm

556. A balikbayan box is placed on top on a flooring of a delivery truck with a coefficient of friction between the floor and the box equal to 0.40. If the truck moves at 60 kph, determine the distance that the truck will move before the box will stop slipping. The box weighs 200 N.

a. 70.8 m
b. 60.8 m
c. 50.8 m
d. 40.8 m

557. At what speed must a 10 kN car approach a ramp which makes an angle of 30° with the horizontal an 18m high at the top such that it will just stop as it reaches the top. Assume resisting force of friction, to be 0.60 kN.

a. 71.57 kph
b. 60.46 kph
c. 54.46 kph
d. 82.52 kph

558. A car weighing 10 kN approaches a ramp which makes a slope of 20° at the speed of 75 kph. At the foot of the ramp, the motor is turned off. How far does the car travel up the inclined before it stops?

a. 64.57 m
b. 46.74 m
c. 74.84 m
d. 54.84 m

559. A car is running up a grade of 1 in 250 at a speed of 28.8 kph when the engine conk out. Neglecting friction, how far will the car have gone after 3 minutes from the point where the engine conk out?

a. 808.2 m
b. 607.8 m
c. 542.4 m
d. 486.8 m

560. A 70 kg man stands on a spring scale on an elevator. During the first 2 seconds starting from rest, the scale reads 80 kg. Find the velocity of the elevator at the end of 2 seconds and the tension T in the supporting cable fro the during the acceleration period. The total weight of the elevator, man and scale is 7000N.

a. 2.8 m/sec; 8000N
b. 3.4 m/sec; 7000N
c. 4.3 m/sec; 9000N
d. 1.5 m/sec; 6000N

561. A cylinder having a mass of 40 kg with a radius of 0.5 m is pushed to the right without rotation and with acceleration 2 m/sec^2. Determine the magnitude and location of the horizontal force P if the coefficient of friction is 0.30.

a. 198 N; 20.2 cm
b. 200 N; 32.4 cm
c. 183 N; 15.7 cm
d. 232 N; 34.2 cm

562. A block having a weight of 400 N rests on an inclined plane making an angle of 30° with the horizontal is initially at rest. After it was released for 3sec, find the distance that the block has traveled assuming that there is no friction between the block and the plane. Compute also the velocity after 3 sec.

a. 22.07 m, 14.71 m/s
b. 27.39 m, 15.39 m/s
c. 20.23 m, 14.60 m/s
d. 15.69 m, 13.68 m/s

563. A block having a weight of 200 N rests on an inclined plane making an angle of 30° with the horizontal is initially at rest. If the block is initially at rest and the coefficient of friction between the inclined plane and the block is 0.20, compute the time to travel a distance of 14.45m, and the velocity of the block after 3 sec.

a. 3 sec, 9.63 m/s
b. 2 sec, 10.12 m/s
c. 4 sec, 12.20 m/s
d. 5sec, 11.20 m/s

564. A 100kg block is released at the top of 30° incline 10 m above the ground. The slight melting of ice renders the surfaces frictionless; calculate the velocity of the foot of the incline.

a. 20 m/s
b. 15 m/s
c. 25 m/s
d. 22 m/s

565. Starting from rest, an elevator weighting 9000 N attains an upward velocity of 5 m/s in 4 sec. with uniform acceleration. Find the apparent weight of 600 N man standing inside the elevator during its ascent and calculate the tension in the supporting cable.

a. 10 823 N
b. 11 382 N
c. 9 254 N
d. 12 483 N

566. A body weighing 40 lb starts from rest and slides down a plane at an angle of 30° with the horizontal for which the coefficient of friction f = 0.30. How far will it move during the third second?

a. 19.63 ft
b. 19.33 ft
c. 18.33 ft
d. 19.99 ft

567. What force is necessary to accelerate a 3000 lbs railway electric car at the rate of 1.25 ft/sec^2, if the force required to overcome the frictional resistance is 400 lbs.

a. 1564.596 lbs
b. 1267.328 lbs
c. 1653.397 lbs
d. 1427.937 lbs

568. A freight car having a mass of 15 Mg is towed along the horizontal track. If the car starts from rest and attains a speed of 8 m/s after traveling a distance of 150m, determine the constant horizontal towing force applied to the car. Neglect friction and the mass of the wheels.

a. 3.2 kN
b. 2.2 kN
c. 4.3 kN
d. 4.1 kN

569. An elevator weighing 2000 lb attains an upward velocity of 16 fps in 4 sec with uniform acceleration. What is the tension in supporting= cables?

a. 2250 lb
b. 2495 lb
c. 1950 lb
d. 2150 lb

570. A block weighing 200N rests on a plane inclined upward to the right at slope 4 vertical to 3 horizontal. The block is connected by a cable initially parallel to the plane

passing through a pulley which is connected to another block weighing 100 N moving vertically. The coefficient of kinetic friction between the 200N block and the inclined plane is 0.10, which of the following most nearly give the acceleration of the system.

a. 2.93 m/sec^2
b. 0.37 m/sec^2
c. 1.57 m/sec^2
d. 3.74 m/sec^2

571. A pick-up truck is traveling forward a5 m/s the bed is loaded with boxes, whose coefficient of friction with the bed is 0.4. What is the shortest time that the truck can be bought to a stop such that the boxes do not shift?

a. 4.75
b. 2.35
c. 5.45
d. 6.37

572. Two barges are weighing 40 kN and the other 80 kN are connected by a cable in quiet water. Initially the barges are 100 m apart. If friction is negligible calculate the distance moved by the 80 kN barge.

a. 20 m
b. 30 m
c. 12 m
d. 25 m

573. Two blocks A and B weighs 150 N and 200 N respectively is supported by a flexible cord which passes through a frictionless pulley which is supported by a rod attached to a ceiling. Neglecting the mass and friction of the pulley, compute the acceleration on the blocks and the tension on the rod supporting the frictionless pulley.

a. 1.40 m/s^2, 342.92 N
b. 1.50 m/s^2, 386.45 N
c. 1.80 m/s^2, 421.42 N
d. 2.2 m/s^2, 510.62 N

574. A pendulum with the concentrated mass “m” is suspended vertically inside a stationary railroad freight car by means of a rigid weightless connecting rod. If the connecting rod is pivoted where it attaches to the boxcar, compute the angle of that the rod makes with the vertical as a result of constant horizontal acceleration of 2m/s.

a. 11°31’
b. 9°12’
c. 6°32’
d. 3°56’

575. Two 15 N weights A and B are connected by a massless string hanging over a smooth frictionless peg. If a third weight of 15N is added to A and the system is released, by how much is the force on the peg increased?

a. 10 kN
b. 12 kN
c. 15 kN
d. 20 kN

576. Three crates with masses A = 45.2 kg, B = 22.8 kg, and C = 34.3 kg are placed with B besides A and C besides B along a horizontal frictionless surface. Find the force exerted by B and C by pushing to the right with an acceleration of 1.32 m/s^2.

a. 45.3 kN
b. 54.2 kN
c. 43.2 kN
d. 38.7 kN

577. Three blocks A, B and C are placed on a horizontal frictionless surface and are connected by chords between A, B and C. Determine the tension between block B and C when a horizontal tensile force is applied at C = 6.5 N. Masses of blocks are A = 1.2 kg, B 2.4 kg, and C = 3.1 kg.

a. 3.50 N
b. 4.21 N
c. 3.89 N
d. 4.65 N

578. A constant force P = 750 N acts on the body shown during only the first 6 m of its motion starting from rest. If u = 0.20, find the velocity of the body after it has moved a total distance of 9m.

a. 3.93 m/s^2
b. 4.73 m/s^2
c. 2.32 m/s^2
d. 3.11 m/s^2

579. A weight 9 kN is initially suspended on a 150 m long cable. The cable weighs 0.002 kN/m. If the weight is then raised 100 m how much work is done in Joules.

a. 915000
b. 938700
c. 951000
d. 905100

580. What is the kinetic energy of 4000 lb automobile which is moving at 44 fps?

a. 1.2 x 10^5 ft-lb
b. 2.1 x 10^5 ft-lb
c. 1.8 x 10^5 ft-lb
d. 3.1 x 10^5 ft-lb

581. A box slides from rest from a point A down a plane inclined 30° to the horizontal. After reaching the bottom of the plane, the box move at horizontal floor at distance 2m before coming to rest. If the coefficient of friction between the box and the plane and the box and the floor is 0.40, what is the distance of point "A" from the intersection of the plane and the floor?

a. 7.24 m
b. 5.21 m
c. 4.75 m
d. 9.52 m

582. A 400 N block slides on the horizontal plane by applying a horizontal force of 200 N and reaches a velocity of 20 m/s in a distance of 30m from rest. Compute the coefficient of friction between the floor and the block.

a. 0.18
b. 0.24
c. 0.31
d. 0.40

583. A car weighing 40 tons is switched to a 2 percent of upgrade with a velocity of 30 mph. If the train resistance is 10 lb/ton, ho9w far up the grade will it go?

a. 1124 ft on slope
b. 2014 ft on slope
c. 1203 ft on slope
d. 1402 ft on slope

584. A car weighing 10 kN is towed along a horizontal surface at a uniform velocity of 80 kph. The towing cable is parallel with the road surface. When the car is at foot of an incline as shown having an elevation of 30m, the towing cable was suddenly cut. At what elevation in the inclined road will the car stop in its upward motion?

a. 55.16 m
b. 60.24 m
c. 51.43 m
d. 49.62 m

585. A wooden block starting from rest, slides 6 m down a 45° slope, then 3m along the level surface and then up 30° incline until it come to rest again. If the coefficient of friction is 0.15 for all surfaces in contact compute the total distance traveled.

a. 20 m
b. 11 m
c. 14 m
d. 18 m

586. The block shown starting from rest and moves towards the right. What is the velocity of block B as it touches the ground? How far will block A travel if the coefficient of friction between block A and the surface is 0.20? Assume pulley to be frictionless.

a. 1.44 m
b. 2.55 m
c. 5.22 m
d. 3.25 m

587. After the block in the figure has moved 3m from rest the constant force P=600N is removed find the velocity of the block when it is returned to its initial position.

a. 8.6 m/s
b. 5.6 m/s
c. 6.4 m/s
d. 7.1 m/s

588. A 10 kg block is raised vertically 3 meters. What is the change in potential energy? Answer in SI units closest to:

a. 350 kg-m^2/ s
b. 320 J
c. 350N-m
d. 294 J

589. A car weighing 40 tons is switched 2% upgrade with a velocity of 30 mph. If the car is allowed to run back what velocity will it have at the foot of the grade?

a. 37 fps
b. 31 fps
c. 43 fps
d. 34 fps

590. A 200 ton train is accelerated from rest to a velocity of 30 miles per hour on a level track. How much useful work was done?

a. 12 024 845
b. 13 827 217
c. 11 038 738
d. 10 287 846

591. A drop hammer weighing 40 kN is dropped freely and drives a concrete pile 150 mm into the ground. The velocity of the drop hammer at impact is 6m/s. What is the average resistance of the soil in kN?

a. 542.4
b. 489.3
c. 384.6
d. 248.7

592. A force of 200 lbf act on a block at an angle of 28° with respect to the horizontal. The block is pushed 2 feet horizontally. What is the work done by this force?

a. 320 J
b. 480 J
c. 540 J
d. 215 J

593. A small rocket propelled test vehicle with a total mass of 100 kg starts from rest at A and moves with negligible friction along the track in the vertical plane as shown. If the propelling rocket exerts a constant thrust T of 1.5 kN from A to position B. where it is shut off, determine the distance S that the vehicle rolls up the incline before stopping. The loss of mass due to the expulsion of gases by the rocket is small and may be neglected.

a. 170 m
b. 165 m
c. 160 m
d. 175 m

594. A body that weighs W Newton fall from rest from a height 600 mm and strikes a sping whose scale is 7 N/mm. If the maximum compression of the spring is 150 mm, what is the value of W? Disregard the mass of spring.

a. 105 N
b. 132 N
c. 112 N
c. 101 N

595. A 100 N weight falls from rest from a height of 500 mm and strikes a spring which compresses by 100 mm. Compute the value of the spring constant, neglecting the mass of the spring.

a. 10 N/mm
b. 15 N/mm
c. 12 N/mm
d. 8 N/mm

596. A 200 N weight falls from rest at height “h” and strikes spring having a spring constant of 10 N/mm. the maximum compression of spring is 100 mm, after the weight the weight stikes the spring. Compute the value of h is meter.

a. 0.12 m
b. 0.10 m
c. 0.15 m
d. 0.21 m

597. A block weighing 500 N is dropped from a height of 1.2 m upon a spring whose modulus is 20 n/mm. What velocity will the block have at the instant the spring is deformed 100 mm?

a. 6.55 m/s^2
b. 5.43 m/s^2
c. 4.65 m/s^2
d. 3.45 m/s^2

598. A 50 kg object strikes the unstretched spring to a vertical wall having a spring constant of 20 kN/m. Find the maximum deflection of the spring. The velocity of the object before it strikes the spring is 40 m/s.

a. 1 m
b. 2 m
c. 3 m
d. 4 m

599. A large coil spring with a spring constant k=120 N/m is elongated, within its elastic range by 1m. Compute the store energy of the spring in N-m.

a. 60
b. 40
c. 50
d. 120

600. To push a 25 kg crate up a 27° inclined plane, a worker exerts a force of 120 N, parallel to the incline. As the crate slides 3.6 m, how much is the work done by the worker and by the force of gravity.

a. 400 Joules

b. 420 Joules
c. 380 Joules
d. 350 Joules

601. A train weighing 12 000 kN is accelerate up a 2% grade with velocity increasing from 30 kph to 50 kph in a distance of 500 m. Determine the horse power developed by the train.

a. 5.394 kW
b. 5.120 kW
c. 4.468 kW
d. 4.591 kW

602. An elevator has an empty weight of 5160 N. It is designed to carry a maximum load of 20 passengers from the ground floor to the 25th floor of the building in a time of 18 seconds. Assuming the average weight of the passenger to be 710 N. and the distance between floors is 3.5 m, what is the minimum constant power needed for the elevator motor?

a. 85.5 kW
b. 97.4 kW
c. 94.3 kW
d. 77.6 kW

603. An engine hoist 1.50 m^3 of a concrete in a 2200 N bucket moves a distance of 12 m in 20 seconds. If concrete weighs 23.5 kN/m^3, determine the engine horsepower assuming 80 efficiency.

a. 32.12 hp
b. 42.23 hp
c. 37.74 hp
d. 28.87 hp

604. A train weighs 15 000 kN. The train's resistance is 9 n per kilo-Newton. If 5000 is available to pull this train up to 2% grade, what will be its maximum speed in kph?

a. 46.2 kph
b. 50 kph
c. 40 kph
d. 35 kph

605. An engine having a 40 hp rating is used as an engine hoist to lift a certain weight of height 8 m. Determine the maximum weight it could lift in a period of 20 sec.

a. 85.5 kW
b. 97.4 kW

c. 74.6 kW
d. 77.6 kW

606. A 100 kg body moves to the right 5 m/s and another 140 kg body moves to the left at 3 m/s. They collided and after impact the 100 kg body rebounds to the left at 2 m/s. Compute the coefficient of restitution.

a. 0.40
b. 0.50
c. 0.30
d. 0.60

607. A ball is dropped from an initial height of 6m above a solid floor, how high will the ball rebound if the coefficient of restitution is e = 0.92?

a. 5.08
b. 5.52
c. 5.41
d. 5.12

608. A ball strikes the ground at an angle of 30° with the ground surface; the ball then rebounds at a certain angle θ with the ground surface. If the coefficient of restitution is 0.80, find the value of θ.

a. 24.79°
b. 18.48°
c. 32.2°
d. 26.7°

609. A ball is thrown with an initial horizontal velocity of 30m/s from a height of 3m above the ground and 40 m from a vertical wall. How high above the ground will the ball strike if the coefficient of restitution is 0.70?

a. 1.46 m
b. 2.52 m
c. 1.11 m
d. 0.89 m

610. Two cars having equal weights of 135 kN are traveling on a straight horizontal track with velocities of 3m/s to the right and 1.5 m/s to the left respectively. They collide and are coupled during impact. Neglecting friction due to skidding, determine their final common velocity and the gain or loss in kinetic energy after impact.

a. 7.74 m/s; 69.67 kN-m
b. 1.25 m/s; 66.35 kN-m
c. 2.06 m/s; 57.25 kN-m

d. 3.12 m/s; 77.36 kN-m

611. A man weighing 68 kg jumps from a pier with horizontal velocity of 6 m/s onto a boat that is rest on the water. If the boat weighs 100 kg, what is the velocity of the boat when the man comes to rest relative to the boat?

a. 2.43 m/s
b. 3.53 m/s
c. 2.88 m/s
d. 1.42 m/s

612. A man weighing 68 kg jumps from a pier with horizontal velocity of 5 m/s onto a 100 kg boat moving towards the dock at 4m/s What would be the velocity of the boat after the man lands on it?

a. -0.56 m/s
b. -0.36 m/s
c. -0.78 m/s
d. -1.33 m/s

613. A ball is thrown at an angle of 40° from the horizontal toward a smooth foor and it rebounds at an angle of 25° with the horizontal floor. Compute the value of coefficient of restitution.

a. 0.56
b. 0.66
c. 0.46
d. 0.76

614. Car B is moving at a speed of 12 m/s and is struck by car A which is moving at a speed of 20 m/s. The weight of car A is 14 tons and of car B is 10 tons. Determine the velocities of the car after impact assuming that the bumpers got locked after impact. Both cars are moving in the same direction to the right.

a. 16.67 m/s
b. 14.25 m/s
c. 15.42 m/s
d. 13.62 m/s

615. Two cars A and B have weights equal to 12 tons and 8 tons respectively are moving in opposite directions. The speed of car A is 22m/s to the right and that of car B is 18 m/s to the left. Two cars bumped each other. Determine the velocity of the cars after impact assuming the bumpers get locked.

a. 6 m/s
b. 8 m/s

c. 4 m/s
d. 3 m/s

616. A 6000 N drop hammer falling freely trough a height of 0.9 m drives a 3000N pile 150mm vertically to the ground. Assuming the hammer and the pile to cling together after the impact, determine the average resistance to penetration of the pile.

a. 32 976 N
b. 42 364 N
c. 30 636 N
d. 28 476 N

617. Two identical balls collide as shown. What is V2' if the coefficient of restitution is 0.8?

a. 4.8 m/s
b. 3.6 m/s
c. 5.6 m/s
d. 2.4 m/s

618. A 16gm mass is moving at 30 cm/s while a 4gm mass is moving opposite direction at 50cm/sec. They collide head on and stick together. Their velocity after collision is:

a. 0.14 m/s
b. 0.21 m/s
c. 0.07 m/s
d. 0.28 m/s

619. A bullet weighing 0.014 kg and moving horizontally with a velocity of 610 m/s strikes centrally a block of wood having a mass of 4.45 kg which is suspended by a cord from a point 1.2 m above the center of the block. To what angle from the vertical will the block and embedded bullet swing?

a. 31.79°
b. 29.32°
c. 30.12°
d. 28.64°

620. A body having a mass of 100kg and having velocity of 10m/s to the right collides with an 80 kg mass having a velocity of 5 m/s to the left. If the coefficient of restitution is 0.5, determine the loss of kinetic energy after impact.

a. 3750 N-m
b. 4260 N-m
c. 3640 N-m
d. 4450 N-m

621. A 0.44N bullet is fired horizontally to an 89.18 N block of wood resting on a horizontal surface which the coefficient of friction is 0.30. If the block is moved a distance 375 mm along the surface, what was the velocity of the bullet before striking?

a. 303.49 m/s
b. 204.61 m/s
c. 142.52 m/s
d. 414.25 m/s

622. A 60 ton rail car moving at 1 mile per hour is instantaneously coupled to a stationary 40 to rail car. What is the speed of the coupled cars?
a. 0.88 mi/hr
b. 1.0 mi/hr
c. 0.60 mi/hr
d. 0.40 mi/hr

623. What momentum does a 40 lbm projectile posses if the projectile is moving 420 mph?

a. 24 640 lbf-sec
b. 16 860 lbf-sec
c. 765 lbf-sec
d. 523.6 lbf-sec

624. A 300 kg block is in contact with a level of coefficient of kinetic friction is 0.10. if the block is acted upon by a horizontal force of 50kg what time will elapse before the block reaches a velocity of 48.3 m/min from rest? If the 50 kg is then removed, hos much longer will the block continue to move?

a. 12.08 sec; 8.05 sec
b. 15.28 sec; 9.27 sec
c. 10.42 sec; 7.64 sec
d. 13.52 sec; 10.53 sec

625. A 100kg body moves to the right at 5m/s and another body of mass W is moves to the left 3m/s. they meet each other and after impact the 100kg body rebounds to the left at 2m/s. Determine the mass of the body if coefficient of restitution is 0.5.

a. 140 kg
b. 150 kg
c. 100 kg
d. 200 kg

626. A wood block weighing 44.75 N rests on a rough horizontal plane, the coefficient of friction being 0.40. if a bullet weighing 0.25 N is fired horizontally into the block with

the velocity of 600m/s, how far will the block be displaced from its initial position? Assume that the bullet remains inside the block.

a. 1.41 m
b. 2.42 m
c. 1.89 m
d. 0.98 m

627. The system is used to determine experimentally the coefficient of restitution. If ball A is released from rest an ball B swings through θ=53.1°, after being struck, determine the coefficient of restitution. Weight of A is 150 N while that of b is 100 N.

a. 0.537
b. 0.291
c. 1.083
d. 0.926

628. The ball A and B are attached to stiff rods of negligible weight. Ball A is released from rest and allowed to strike B. If the coefficient of restitution is 0.60, determine the angle θ through which ball B will swing. If the impact lasts for 0.01 sec, also find the average impact force. Mass of A is 15kg and that of B is 10kg.

a. 64.85° ; 6720 N
b. 60.58° ; 6270 N
c. 57.63° ; 7660 N
d. 73.32° ; 7670 N

629. A 1500N block is in contact with a level plane whose coefficient of kinetic friction is 0.10. If the block is acted upon a horizontal force of 250 N, at what time will elapse before the block reaches a velocity of 14.5m/s starting from rest?

a. 22.17 sec
b. 18.36 sec
c. 21.12 sec
d. 16.93 sec

630. A 1600N block is in contact with a level plane whose coefficient of kinetic friction is 0.20. If the block is acted upon a horizontal force of 300 N initially when the block is at rest and the force is removed when the velocity of the block reaches 16m/s. How much longer will the block continue to move?

a. 8.15 sec
b. 6.25 sec
c. 4.36 sec
d. 5.75 sec

631. A bullet weighing 0.30N is moving 660m/s penetrates an 50N body and emerged with a velocity of 180 m/s. For how long will the body moves before it stops? Coefficient of friction is 0.40.

a. 7.34 sec
b. 6.84 sec
c. 5.24 sec
d. 8.36 sec

632. A 1000N block is resting on an incline plane whose slope is 3 vertical to 4 horizontal. If a force of 1500 N acting parallel to the inclined plane pushes the block up the inclined plane, determine the time required to increase the velocity of the block from 3m/s to 15m/s. Coefficient of friction between the block and the plane is 0.20.

a. 1.65 sec
b. 1.86 sec
c. 2.17 sec
d. 3.64 sec

633. The 9kg block is moving to the right with a velocity of 0.6 m/s on the horizontal surface when a force P is applied to it at t=0. Calculate the velocity V2 of the block when the t=0.4 sec. the kinetic coefficient of friction is Mk = 0.30.

a. 1.82 m/s
b. 1.23 m/s
c. 2.64 m/s
d. 2.11 m/s

634. A 50kg block initially at rest is acted upon by a force P which varies as shown. Knowing the coefficient of kinetic friction between the block and the horizontal surface is 0.20, compute the velocity of the block after 5 s, and after 8s.

a. 15.19 m/s; 16.804 m/s
b. 13.23 m/s; 15.534 m/s
c. 10.65 m/s; 17.705 m/s
d. 17.46 m/s; 14.312 m/s

635. The motion of the block starting from rest is governed by the a-t curve shown. Determine the velocity and distance traveled after 9 sec. Neglecting friction.

a. 66 m/s; 228 m
b. 45 m/s; 233 m
c. 57 m/s, 423 m
d. 72 m/s; 326 m

636. From the V-t curve shown compute the distance traveled by a car starting form rest after 6 sec.

a. 50m
b. 60 m
c. 70 m
d. 80 m

637. A bullet weighing 50g is fired into a block of wood weighing 20 lbs on a top of a horizontal table. The block moves 45 cm. the coefficient of friction between the block and table is 0.30. What is the speed of the bullet in kph before hitting the block? Assume that the bullet is embedded of the block.

a. 1068.77 kph
b. 1843.53 kph
c. 1144.38 kph
d. 1683.78 kph

638. A block weighing 60 N is subjected to a horizontal force P = (10 + t^3) and a friction resisting equal to (6 + t^2). Compute the velocity of the block 2 s after it has started from rest.

a. 2.4 m/s
b. 1.8 m/s
c. 2.8 m/s
d. 1.4 m/s

639. A price tag of P1200 is specified if paid within 60 days but offers 3% discount for cash in 30 days. Find the rate of interest.

a. 37.11%
b. 38.51 %
c. 40.21 %
d. 39.31 %

640. It is the practice of almost all banks in the Philippines that when they grant a loan, the interest the interest for one year is automatically deducted from the principal amount upon release of money to a borrower. Let us that you applied for a loan with a bank and the P80 000 was approved with interest rate of 14% which P11 200was deducted and you were given a check of P68 800. Since you have to pay the amount of P80 000 in one year after, what then will be the effective interest rate?

a. 16.28%
b 16.18%
c. 16.30%
d. 16.20%

641. Mr. J. dela Cruz borrowed money from a bank. He received from the bank P1 340 and promised to pay P1 500 at the end of 9 months. Determine the simple interest rate and the corresponding discount rate or often referred to as “Banker’s Discount”.

a. 15.92%; 13.73 %
b. 18.28%; 13.12 %
c. 12.95%; 17.33 %
d. 19.25%; 13.33%

642. A man borrowed from a bank with a promissory note that he signed in the amount of P25000 for a period of one year. He received only the amount of P21, 915 after the bank collected the interest and additional amount of P85 00 for notarial and inspection fees. What was the rate of interest that the bank collected in advance?

a. 13.64%
b. 18.37%
c. 16.43%
d. 10.32%

643. Agnes Abadilla was granted a loan of P20 000 by her employer CPM Industrial Fabricator and Construction Corporation with an interest rate of 6% for 180 days on the principal collected in advance. The corporation will accept a promissory note for P20 000 non-interest for 180 days. If discounted at once, find the proceeds on the note.

a. P18 800
b. P19 000
c. P18 000
d. P18 400

644. P400 is borrowed for 75 days at 16% per annum simple interes. How much wil be due at the end of 75 days?

a. P4168.43
b. P5124.54
c. P4133.33
d. P5625.43

645. Mr. Almagro made a money market of P1 000 000 for 30 days at 7.5% per year. If the withholding tax is 20%, what is the net interest that he will receive at the end of the month?

a. P3 000
b. P4 000
c. P6 000
d. P5 000

646. L for a motorboat specifies a cost of P1200 due at the end of 100 days but offers 4% discount for cash in 30 days. What is the highest rate, simple interest at which the buyer can afford to borrow money in order to take advantage of the discount?

a. 18.4%
b. 19.6%
c. 20.9%
d. 21.4%

647. In buying a computer disk, the buyer was offered the options of paying P250 cash at the end of 30 days or P270 at the end of 120 days. At what rate is the buyer paying simple interest if he agree to pay at the end of 120 days.

a. 32%
b. 40%
c. 28%
d. 25%

648. On March 1, 1996 Mr. Almagro obtains a loan of P1500 from Mr. Abella and signs a note promising to pay the principal and accumulated simple interest at rate of 5% at the end of 120 day. On March 15, 1996, Mr. Abella discounts the note at the bank whose discount rate is 6%. What does he receive?

a. P 2 201.48
b. P1 123.29
c. P1 513.56
d. P938.20

649. A deposit of P110 000 was made for 31 days. The net interest after deducting 20% withholding tax is P890.36. Find the rate of return annually.

a. 12.25
b. 11.75
c. 12.75
d. 11.95

650. If you borrowed money from your friend with simple interest of 12%, find the present worth of P50 000, which is due at the end of 7 months.

a. P46 200
b. P44 893
c. P46 729
d. P45 789

651. A man borrowed P2000 from a bank and promises to pay the amount for one year. He received only the amount of P1920 after the bank collected an advance interest of P80. What was the rate of discount and the rate of interest that the bank collected in advance.

a. 4%, 4.17%
b. 3%, 3.17%
c. 4%, 4.71%
d. 3%, 3.71%

652. The amount of P12 800 in 4yrs. At 5% compounded quarterly is ______?

a. P 14 785.34
b. P 15 614.59
c. P 16 311.26
d. P 15 847.33

653. A man borrows money from a bank which uses a simple discount rate of 14%. He signs a promissory note promising to pay P500 per month at the end of 4^{th}, 6^{th}, and 7^{th} months respectively. Determine the amount of money that he received from the bank.

a. P1403.68
b. P1340.38
c. P1102.37
d. P1030.28

654. A nominal interest of 3% compounded continuously is given on the account. What is the accumulated amount of P10 000 after 10 years?

a. P13 610.10
b. P13 500.10
c. P13 498.60
d. P13 439.16

655. By the condition of a will, the sum of P2000 is left to a girl to be held in thrust fund by her guardian until it amounts to P50 000. When will the girl receive the money if the fund is invested at 8% compounded quarterly?

a. 7.98 years
b. 10.34 years
c. 11.57 years
d. 10.45 years

656. A man expects to receive P25 000 in 8 years. How much is that worth now considering interest at 8% compounded quarterly?

a. P13 859.12
b. P13 958.33
c. P13 675.23
d. P13 265.83

657. P500 000 was deposited at an interest of 6% compounded quarterly. Compute the compounded interest after 4 years and 9 months.

a. 163 475.37
b. 178 362.37
c. 158 270.37
d. 183 327.37

658. If the nominal interest rate is 3%, how much is P5000 worth in 10 years in a continuous compounded account?

a. P5750
b. P6750
c. P7500
d. P6350

659. P200 000 was deposited for a period of 4 years and 6 months and bears on interest of P85 649.25. What is the rate of interest if it is compounded quarterly?

a. 8%
b. 6%
c. 7%
d. 5%

660. How many years will P100 000 earned a compound interest o P50 000 if the interest rate is 9% compounded quarterly?

a. 3.25
b. 4.55
c. 5.86
d. 2.11

661. A certain amount was deposited 5 years and 9months ago at an intrest 8% compounded quarterly. If the sum now is P315 379.85, how much was the amount deposited?

a. P200 000
b. P180 000
c. P240 000
d. P260 000

662. Compute the effective annual interest rate which is equivalent to 5% nominal annual interest compounded continuously.

a. 5.13%
b. 4.94%
c. 5.26%
d. 4.9%

663. Find the time required fro a sum of money to triple itself at 5% per annum compounded continuously?

a. 21.97 yrs.
b. 25.34 yrs.
c. 18.23 yrs.
d. 23.36 yrs.

664. A man wishes to have P40 000 in a certain fund at the end of 8years. How much should he invest in a fund that will pay 6% compounded continuously?

a. P24 751.34
b. P36 421.44
c. P28 864.36
d. P30 486.42

665. If the effective annual interest rate is 4%, compute the equivalent nominal annual interest compounded continuously.

a. 3.92%
b. 4.10%
c. 3.80%
d. 4.09%

666. What is the nominal rate of interest compounded continuously for 10 years if the compounded amount factor is equal to 1.34986?

a. 3%
b. 4%
c. 5%
d. 6%

667. American Express Corp. charges 1.5% interest per month, compounded continuously on the unpaid balance purchases made on this credit card. Compute the effective rate of interest.

a. 19.72%
b. 20.25%

c. 21.20%
d. 13.19%

668. If the nominal interest is 12% compounded continuously, compute the effective rate of annual interest.

a. 12.75%
b. 11.26%
c. 12.40%
d. 11.55%

669. Compute the difference in the future amount of P500 compounded annually at nominal rate of 5% and if it is compounded continuously for 5 years at the same rate.

a. P3.87
b. P4.21
c. P5.48
d. P6.25

670. If the effective interest rate is 24%, what nominal rate of interest is charged for a continuously compounded loan?

a. 21.51%
b. 22.35%
c. 23.25%
d. 21.90%

671. What is the nominal rate of interest compounded continuously for 8 years if the pre4sent worth factor is equal to 0.6187835?

a. 4%
b. 5%
c. 6%
d. 7%

672. What is the difference of the amount 3 yrs. for now for a 10% simple interest and 10% compound interest per year?

a. P155
b. P100
c. same
d. P50

673. Find the discount is P2000 is discounted for 6 months and at 8% compounded quarterly.

a. P76.92
b. P80.00
c. P77.66
d. P78.42

674. If a sum of money triples in a certain period of time at a given rate of interest, compute the value of the single payment present worth factor.

a. 0.333
b. 3
c. 0.292
d. 1.962

675. If the single payment amount factor for a period of 5 years is 1.33822. What is the nearest value of the interest rate?

a. 8%
b. 7%
c. 5.50%
d. 6%

676. If the single payment present worth factor for a period of 8 years is 0.58201, compute the nearest value of the rate for that period.

a. 6%
b. 7%
c. 6.5%
d. 8%

677. If money is worth 8% compounded quarterly, compute the single payment amount factor for a period of 6 years.

a. 1.60844
b. 0.62172
c. 1.70241
d. 0.53162

678. Which of these gives the lowest effective rate of interest?

a. 12.35% compounded annually
b. 11.9% compounded semi-annually
c. 12.2% compounded quarterly
d. 11.6% compounded monthly

679. It takes 20.15 years to quadruple your money if invested x% compounded semi-annually. Find the value of x.

a. 8%
b. 6.5%
c. 7%
d. 5%

680. It takes 13.87 years to treble the money at the rate of x% compounded quarterly. Compute the value of x.

a. 5%
b. 6%
c. 7%
d. 8%

681. Money was invested at x% compounded quarterly. If it takes the money up to quadruple in 17.5 years, find the value of x.

a. 8%
b. 6%
c. 7%
d. 5%

682. Fifteen years ago P1000 was deposited in a bank account an today it is worth P2370. The bank pays semi-annually. What was the interest rate paid on this account?

a. 4.9%
b. 5.8 %
c. 5.0%
d. 3.8%

683. You borrow P3500 for one year from a friend at an interest rate of 1.5 per month instead of taking a loan from a bank at rate of 18% a year. Compare how much money you will save or lose on the transaction.

a. You will pay P155 more than if you borrowed from the bank
b. You will save P55 by borrowing from your friend
c. You will pay P85 more that if you borrowed from the bank
d. You will pay P55 less than if you borrowed from the bank

684. Find the present worth of a future payment of P100 000 to be made in 10 years with an interest of 12% compounded quarterly.

a. P30444.44
b. P33000.00
c. P30655.68
d. P30546.01

685. An initial deposit of P80 000 in a certain bank earns 6% interest per annum compounded monthly. If the earnings from the deposit are subject to 20% tax what would be the net value of the deposit be after three quarters?

a. P95324.95
b. P82938.28
c. P68743.24
d. P56244.75

686. The effective rate of interest of 14% compounded semi-annually is:

a. 14.49%
b. 14.36%
c. 14.94%
d. 14.88%

687. The amount of P50 000 was deposited in the bank earning an interest of 7.5% per annum. Determine the total amount at the end of % years, if the principal and interest were not withdrawn during the period?

a. P71 781.47
b. P72 475.23
c. P70 374.90
d. P78 536.34

688. What is the effective rate corresponding to 18% compounded daily? Take 1 year is equal to 360 days.

a. 18.35%
b. 19.39%
c. 18.1%
d. 19.72%

689. If P1000 becomes P1126.49 after 4 years when invested at a certain nominal rate of interest compounded semi-annually determine the nominal rate and the corresponding effective rate.

a. 3% and 3.02%
b. 4.29% and 4.32%
c. 2.30% and 2.76%
d. 3.97% and 3.95%

690. Convert 12% semi-annually to compounded quarterly

a. 19.23% compounded quarterly

b. 23.56% compounded quarterly
c. 14.67% compounded quarterly
d. 11.83% compounded quarterly

691. What is the corresponding effective interest rate of 18% compounded semi-quarterly?

a. 19.25%
b. 19.48%
c. 18.46%
d. 18.95%

692. If P5000 shall accumulate for 10 years at 8% compounded quarterly, find the compounded interest at the end of 10 years.

a. P6005.30
b. P6000.00
c. P6040.20
d. P6010.20

693. A couple borrowed P4000 from a lending company for 6 years at 12%. At the end of 6 years, it renews the loan for the amount due plus P4000 more for 3 years at 12%. What is the lump sum due?

a. P14 842.40
b. P16 712.03
c. P12 316.40
d. P15 382.60

694. How long (years) will it take money if it earns 7% compounded semi-annually?

a. 26.30
b. 40.30
c. 33.15
d. 20.15

695. P200 000 was deposited on Jan. 1, 1988 at an interest rate of 24% compounded semi-annually. How much would the sum be on Jan. 1, 1993?

a. P421 170
b. P521 170
c. P401 170
d. P621 170

696. If P500 000 is deposited at a rate of 11.25% compounded monthly; determine the compounded interest rate after 7 years and 9 months.

a. 690 849
b. 670 258
c. 680 686
d. 660 592

697. P200 000 was deposited at an interest rate of 24% compounded semi-annually. After how many years will the sum be P621 170?

a. 4
b. 3
c. 5
d. 6

698. A bank is advertising 9.5% accounts that yield 9.84 annually. How often is the interest compounded?

a. monthly
b. bi- monthly
c. quarterly
d. daily

699. Evaluate the integral of 2dx/(4x+3) if the upper limit is 5 and the lower limit is 1.

a. 0.595
b. 0.675
c. 0.486
d. 0.387

700. Evaluate the integral of 2xdx/(2x^2+4) if the upper limit is 6 and the lower limit is 3.

a. 0.620
b. 0.675
c. 0.486
d. 0.580