KENDRIYA VIDYALAYA SANGATHAN , ERNAKULAM REGION

SUMMATIVE ASSESSMENT – II (2013-14)

Class : X **Mathematics** **ANSWER KEY**

Section A (8 x 1 = 8) **(1 mark each)**

1. (b) 3 **2**. (b) 1:4 **3.** (b) −3 **4**.(a) 256 π

5. (a)15 m **6**. (d) 4 **7**. (c) 50° **8**. c) 4/9

Section B (6 x 2 = 12)

9. a = -5 , a_n = 45 , S_n = 120 ½

(n/2) (a+ a_n) = 120 ½

(n/2) (-5+ 45) = 120 ½

(n/2) = 3 , n = 6 ½

10. $\frac{1}{2}\left[x_1(y_2-y_3)+x_2(y_3-y_1)+x_3(y_1-y_2)\right]$ = area 1/2

$\frac{1}{2}\left[-1(p-11)+2(11+1)+8(-1-p)\right]$ = 0 1/2

– p +11 + 24 – 8 – 8p = 0

– 9p = –27 1/2

p = 3 1/2

Or

(3p-2) / 2 = 5 , 3p-2= 10 , 3p = 12 , p=4 1

(4+2q) / 2 = 3 , 4+2q = 6 , 2q = 2 , q = 1 1

11. BR = BP =3cm , AR= AQ = 4 cm 1

CQ = 11- 4 = 7 cm

CP = 7 cm ½

BC = 7 + 3 = 10 cm ½

12. Volume = $\frac{1}{3}$ π h (r^2 + R^2 + rR) 1/2

= $\frac{1}{3}\times\frac{22}{7}\times 4\times[\ 4^2+(7)^2+(4\text{x}7)\ ]$ 1/2

= $\frac{1}{3}\times\frac{22}{7}\times 4\times[\ 16+49+28\ ]$ 1/2

= $\frac{88}{21}\times[\ 93\ ]$ =389.7 cm^3. 1/2

13. D = b^2 – 4ac = 0 ½

$(-24)^2$ – 4(9)(p) = 0 ½

576 = 36 p ½

p = 16 ½

14. ℓ = 20 cm , b = 10 cm , h= 10 cm ½

SA = 2 x (ℓb+bh+ℓh) ½

= 2 x ((20x10) + (10x10) +(10x20)) ½

=2 x 500 = 1000 sq.cm ½

<u>SECTION C</u> : <u>(10 x 3= 30)</u>

15. $\frac{2}{3}\pi R^3 \div \frac{2}{3}\pi r^3 = 64/27$ 1

$R^3 \div r^3 = 64/27$ ½

$R \div r = 4/3$ ½

$2\pi R^2 \div 2\pi r^2 = (4/3)^2 = 16/9$ 1

16 Total cards = 52 1

a) P(black king) = 2/52 or 1/26 1

b) P(an ace) = 4/52 or 1/13 1

17. Canvas area = $2\pi r h + \pi r \ell$ 1

$= \pi r (2h + \ell)$

= (22/7) x (105/2) x (6 +53) 1/2

= 9735 sq.m 1/2

Cost = 9735 x 10 = Rs 97350 1

18. DR=DS, AR=AQ ,BQ=BP (tangents from an external point) 1/2

DS = 8cm ∴ DR = 8cm 1/2

AR = 24 – 8 = 16 cm , AQ =16 cm 1/2

BQ = 30 – 16 = 14 cm , BP =14 cm 1/2

$\angle B = 90^0$, $\angle OQB = \angle OPB = 90^0$

∴ $\angle POQ = 90^0$ Also, BQ=BP . ∴ OPBQ is a square. 1/2

So, r = BP= 14 cm. 1/2

19. $a_4+a_8 = 37$ …….. ½

a+3d+a+7d = 37 , 2a +10d = 37 ……… ½

$a_6+a_{12} = 46$ ……… ½

a+5d+a+11d = 46 , 2a+16d = 46 ……… ½

so, 6d = 9 , d= 9/6=3/2 …… ½

getting a= 11 …… ½

20. circle 1

Construction of tangents 2

Or

Triangle PQR 1

Similar triangle 2

21.

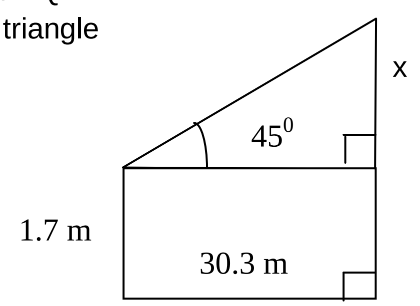


Figure 1

$\tan 45^0 = \frac{x}{30.3}$ ½

$1 = \frac{x}{30.3}$, x = 30.3 m ½

Height of the tower = 30.3+1.7 = 32 m 1

22 . $D = b^2 - 4ac = (8ab)^2 - 4(3a^2)(4b^2) = 64\,a^2b^2 - 48\,a^2b^2 = 16\,a^2b^2$ 1

$x = (-b \pm \sqrt{D})/2a$ ½

$= (-8ab \pm \sqrt{16a^2b^2}) \div 2(3a^2)$ ½

$= (-8ab \pm 4ab) \div 6a^2$

$= \frac{-12ab}{6a^2}, \frac{-4ab}{6a^2}$ $= -2b/a$ and $-2b/3a$ ½ + ½

OR

$\frac{x-1+2x-4}{x^2-3x+2} = \frac{6}{x}$ 1

$\frac{3x-5}{x^2-3x+2} = \frac{6}{x}$ ………… 1/2

$3x^2 - 13x + 12 = 0$ ……. 1/2

x = 3 , 4/3 …… 1

23. i) volume of 1 packet = ℓ x b x h = 6x3x2 = 36 cm^3. ½

No.of packets in 1 box = 1800/36 = 50 ½

So, no. of boxes needed = 500/50 = 10 ½

ii) volume of a cuboid ½

iii) Sharing and caring , empathy , teamwork etc. . 1

24. No.s : 108, 117, …….,198 ……. 1/2

form an AP with a = 108 , d=9, $a_n = 198$

$a + (n-1)\,d = a_n$…… 1/2

108 + (n– 1) 9 = 198

(n– 1)9 = 198 – 108 = 90

n– 1 = 10

getting n = 11………… 1

$S_n = \frac{n}{2}(a + a_n)$ ………… 1/2

$S_{11} = \frac{11}{2}(108 + 198)$

=1683 ½

OR

$a_1 = 4(1) - 1 = 3$, $a_2 = 4(2) - 1 = 7$ ½ +½

d = 7-3 = 4 ½

n = 20

$S_n = n/2\ (2a + (n-1)d)$ ½

= 10 x (6+19x4) ½

= 10 x 82 = 820 ½

SECTION D : (10 x 4 = 40)

25. Figure, Given, to prove, construction — 2
correct proof — 2

26. . Let the original speed be x km/hr. — 1/2

Given, $\frac{1200}{x} - \frac{1200}{x+100} = 1$ ………. — 1

$\frac{1200x + 120000 - 1200x}{x(x+100)} = 1$ — 1/2

$x^2 + 100x = 120000$

$x^2 + 100x - 120000 = 0$ — 1/2

$D = b^2 - 4ac = (100)^2 - 4(1)(-120000) = 490000$

$x = \frac{-b \pm \sqrt{D}}{2a} = \frac{-100 \pm \sqrt{490000}}{2(1)} = \frac{-100 \pm 700}{2} = \frac{-800}{2}, \frac{600}{2}$ — 1

X = -400 , 300

Speed cannot be negative. So, original speed = 300 km/hr — 1/2

OR

Let the original speed be x km/hr. — 1/2

Given, $\frac{24}{18 - x} - \frac{24}{18+x} = 1$ — 1

Solving,

$x^2 + 48x - 324 = 0$ — 1/2

$D = b^2 - 4ac = (48)^2 - 4(1)(-324) = 2304 + 1296 = 3600$ — 1/2

$x = \frac{-b \pm \sqrt{D}}{2a} = \frac{-48 \pm 60}{2(1)}$ = (– 108)/ 2 , 12/2 = - 54 , 6 — 1

Speed cannot be negative. So, original speed = 6 km/hr — ½

27. P(2,−1) , Q (3,4) , R(−2,3) and S(−3,−2)

$PQ = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$ — 1/2

$= \sqrt{(3-2)^2 + (4+1)^2} = \sqrt{1+25} = \sqrt{26}$ — 1/2

$QR = \sqrt{(3+2)^2 + (4-3)^2} = \sqrt{26}$ — 1/2

$RS = \sqrt{(-2+3)^2 + (3+2)^2} = \sqrt{26}$ — 1/2

$SP = \sqrt{(2+3)^2 + (-1+2)^2} = \sqrt{26}$ — 1/2

$PR = \sqrt{(2+2)^2 + (-1-3)^2} = \sqrt{32}$ — 1/2

$QS = \sqrt{(3+3)^2 + (4+2)^2} = \sqrt{72}$ — 1/2

4 equal sides , but diagonals are not equal. .So, rhombus — 1/2

28. Total no.of cards = 40 1

(a) numbers divisible by 3 and 5 = 15,30

P (a no. divisible by 3 and 5) = 2/40 1

(b) prime numbers = 2,3,5,7,11,13,17,19,23,29,31and 37.

P(a prime number) = 12/40 1

(c) perfect squares = 1,4,9,16,25,36

P (a perfect square) = 6/40 1

29. CSA of cylinder = 5280 / 15 = 352 m^2. 1

$2\pi r h = 352$ ½

2 x (22/7) x r x 16 = 352 ½

r =(7 /2) m ½

capacity of cylinder = $\pi r^2 h = \frac{22}{7} \times \frac{7}{2} \times \frac{7}{2} \times 16 = 616\ m^3$. 1½

30. area of square = 14 x 14 = 196 cm^2 1

Semi-circle:

d = 14 cm, r = 7cm.

area = ½ πr^2 1/2

$= \frac{1}{2} \times \frac{22}{7} \times 7 \times 7 = 77 cm^2$. 1/2

Area of quadrant II = ¼ πr^2 1/2

= ¼ x (22/7) x7x7 = 77/2 cm^2. 1/2

Area of III = 77/2 sq.cm

Area of shaded region = 196 - (77 + 77) cm^2 1/2

= 42cm^2. 1/2

OR

Area of Δ ABC = ½ bh = ½ x 6 x 8= 24 sq.cm 1

Join O to A , B and C

(½ x 10 x r) +(½ x 6 x r) + (½ x 8 x r) = 24 1

½ x r x (10+6+8) = 24

Radius = 2 cm 1

Area of circle = πr^2

= 22/7 x 2 x 2 = 88/7 sq.cm 1

31 320,360,400,….. form an A.P with a = 320, d = 40 1

S_n = 20000

n/2 (2a +(n-1)d) = 20000 ………………. ½

n/2 x (640 +(n-1)d x 40) = 20000 ½

n (640 + 40 n – 40) = 40000

n(600+40n) = 40000 ½

$40n^2+600n - 40000 = 0$

$n^2+15n - 1000 = 0$ 1

n = 25 , -40(rejected)

So , his savings will be Rs 20000 in 25 months. 1/2

32. r + h = 37 cm ½

TSA = $2\pi r(r+h) = 1628$ ½

$2 \times \frac{22}{7} \times r \times 37 = 1628$ ½

r = 7 cm 1

h = 37 – 7 = 30 cm ½

volume = $\pi r^2 h = \frac{22}{7} \times 7 \times 7 \times 30 = 4620\ cm^3$. 1

OR

Let radii of the cones be r and R , their heights be h and H

$\frac{1}{3}\pi r^2 h \div \frac{1}{3}\pi R^2 H = 1/64$ 1

$r^2 h \div R^2 H = 1/64$ 1/2

But r/R = h /H 1/2

So, $h^3 \div H^3 = 1/64$ 1/2

$h^3 \div (32)^3 = 1/64$ 1/2

solving , h = 8 cm 1/2

The cut is made 32 – 8 = 24 cm above the base 1/2

33. Let the ratio be k:1 , point be (0,y) 1/2

$x = \frac{m_1 x_2 + m_2 x_1}{m_1 + m_2} \Rightarrow 0 = \frac{k(-1) + 1(5)}{k+1}$ 1

-k + 5 = 0 , k= 5 1/2

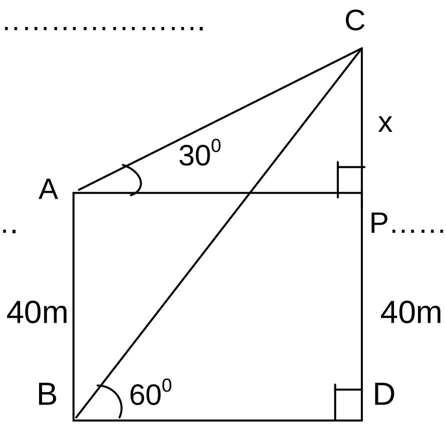
Ratio = 5 : 1 1/2

$y = \frac{m_1 y_2 + m_2 y_1}{m_1 + m_2} \Rightarrow y = \frac{5(-4) + 1(-6)}{5+1}$ 1/2

y = (-20 – 6) / 6 = -26/6 = -13 / 2 1/2

point of division is (0 , -13/2) 1/2

34. . Correct figure ………………… 1/2



Let the 1st pole be AB = 40m
and second pole be CD.
Let CP = x
PD = AB = 40m ………… P…………… 1/2

In rt. Δ ACP, $\tan 30^0 = \frac{CP}{AP}$

$\frac{1}{\sqrt{3}} = \frac{x}{AP}$

AP = $\sqrt{3}x$ …………(eqn1) 1

In rt. Δ BCD, $\tan 60^0 = \frac{CD}{BD}$

$\sqrt{3} = \frac{x+40}{AP}$

$\sqrt{3} = \frac{x+40}{\sqrt{3}x}$ (from 1)

$3x = x+40$

$x = 20$ ………………… 1

$AP = \sqrt{3}x = 20\sqrt{3}$m

Height of the other pole = 20 + 40 =60 m 1/2

Width of the river = $20\sqrt{3}$m 1/2

Note : **proportional marks are to be given for other alternative methods**

****