SAMPLE QUESTION PAPER

MATHEMATICS
CLASS-X (2016-17)
SUMMATIVE ASSESSMENT -II

MARKING SCHEME

SECTION -A

1. 7/11 [1]
2. 136 [1]
3. 60° [1]
4. 34° [1]

SECTION-B

5. Here a=4, d=4 and a_n= 96 [1/2]
So, $a_n = a + (n-1)d$
96 = 4+(n-1)4
∴ n=24 [1/2]

Now, $S_{24} = \frac{n}{2}(a+a_n)$ [1/2]

∴ $S_{24} = 1200$ [1/2]

6. Let A(-1 , 3), B(2 , p) and C(5 , - 1) be 3 collinear points.
Then Area ΔABC = 0 [1/2]
Then, $\frac{1}{2}$ [-1(p+1)+2(-1-3)+5(3-p)]=0 [1]
i.e. -p-1-8+15-5p=0
i.e. 6=6p
i.e. p=1 [1/2]

7. For equal roots, $b^2-4ac=0$ [1/2]
Here, a= k, b= -k and c=1
∴$k^2 - 4(k)(1)=0$ [1/2]
i.e. k(k- 4)=0
i.e. k=0 or k= 4 [1/2]
rejecting k=0, we get k= 4. [1/2]

8. Perimeter of ΔABC= AB+BC+CA
= AB+[BP+CP]+CA [1/2]
= AB+BQ+CR+CA (Tangents from an external point are equal) [1/2]
= AQ+AR [1/2]
= AR+AR (Tangents from an external point are equal)
=2AR [1/2]

9. Point R divides PQ in ratio 2:3. [1/2]

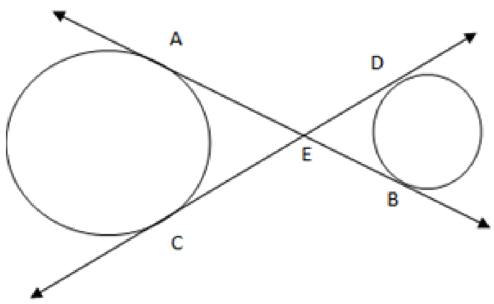
Co-ordinates of point R are given by

$x = (2 \times -3 + 3 \times 2)/5 = 0$ [1/2]

$y = (2 \times 4 + 3 \times -1)/5 = 1$ [1/2]

So, the required point R is (0,1) [1/2]

10.



Tangents drawn to a circle from same external point are equal in length. So, [1/2]

AE= CE ------------ (1) [1/2]

And EB = ED ------------- (2) [1/2]

Adding (1) and (2) , we get,

AB = CD. [1/2]

SECTION – C

11. $x^2 + 12x - 45 = 0$

Using the method of completing the square,

$x^2 + 12x - 45 + 36 = 36$ [1/2]

i.e. $x^2 + 12x + 36 = 36 + 45$

i.e. $(x+6)^2 = 81$ [1]

i.e. $(x+6) = \pm 9$ [1/2]

i.e. x= 3 or -15 [1]

12. $\dfrac{a+9d}{a+29d} = \dfrac{1}{3}$ [1]

i.e. 3a +27 d = a+29 d

i.e. a=d-------------(1) [1/2]

Also, S_6 =42

i.e. $\frac{6}{2}$(2a+5d)=42 [1]

i.e. 3(2a+5a)=42 Using... (1)

i.e. 3(7a)=42

i.e. a= 2 [1/2]

13. Let AB represent the lighthouse.

$\angle ACB$=45°and $\angle ADB$=30°

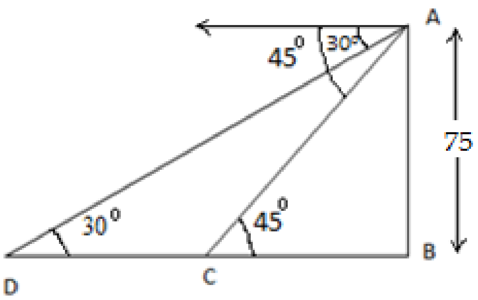


Fig [1]

In ΔABC,

tan 45°= AB/BC

1=75/ BC

i.e. BC=75m [1]

Now, in ΔABD,

tan 30°= AB/BD

i.e. 1/$\sqrt{3}$= 75/ (BC+CD)

i.e. 1/$\sqrt{3}$ = 75/ (75 +CD)

i.e. 75+CD= 75$\sqrt{3}$

i.e.CD= 75($\sqrt{3} - 1$) m [1]

14. Let A(-1,3), B(1,-1) and C(5,1) be the vertices of ΔABC.

Median through C would be the line joining C and midpoint of side AB. Let it be point D

D = ($\frac{-1+1}{2}$,$\frac{3-1}{2}$) [1]

Coordinates of D are (0,1) [1/2]

Length of median CD = $\sqrt{(5-0)^2 + (1-1)^2}$ [1]

= 5 units. [1/2]

15. No. of cards left = 52-3=49

P(face card)= $\frac{9}{49}$ [1]

P(red card)= $\frac{23}{49}$ [1]

P(a king)= $\frac{3}{49}$ [1]

16. $\frac{\theta}{360}\times 2\pi r = 44.$ [1/2]

Putting r=42cm, we get θ= 60° [1]

Now, Area of minor segment= Area of minor sector- Area of Δ

Since θ= 60°, so the triangle formed will be an equilateral Δ

∴ Area of minor segment= Area of minor sector- Area of equilateral Δ

i.e. Area of minor segment = $\frac{\theta}{360}\times\pi r^2 - \frac{\sqrt{3}}{4}a^2$ [1]

$= 924-441\sqrt{3}$ cm^2 [1/2]

17. Time required to fill the conical vessel= Volume of cone / volume of water coming out of cylindrical pipe per unit time [1/2]

$= \frac{\frac{1}{3}\pi {r_1}^2 h_1}{\pi {r_2}^2 h_2}$ [1]

$= [1/3\ \pi(40)^2 \times 72]/\pi(2)^2 \times 20 \times 100$ [1]

= 4.8 minutes [1/2]

18. Area of shaded region = Area of semicircle with diameter PS – Area of semicircle with diameter QS + Area of semicircle with diameter PQ. [1]

So, required area = ½ $\pi(6)^2$ – ½ $\pi(4)^2$ + ½ $\pi(2)^2$ [1]

= ½ π[36-16+4] cm^2 [1/2]

= 37.71 cm^2 [1/2]

19. No. of lead shots $=\frac{Volume\ of\ cuboid}{Volume\ of\ sphere}$ [1/2]

$= \frac{l_1 b_1 h_1}{\frac{4}{3}\pi {r_2}^3}$ [1]

$=\frac{24\times 22\times 12\times 3}{\pi\times 3\times 3\times 3\times 4}$ [1]

$= 56$ [1/2]

20. Required surface area = 2 πrh +2 x [2 πr^2] [½ + ½]

= 2 x πx 3.5 x 10 + 4 π (3.5)^2 [1]

= 374 cm^2 [1/2]

Cost of polishing = Rs.374 x 10 = Rs.3740 [1/2]

SECTION -D

21. Correct Construction of ΔABC [2]

Correct construction of similar triangle [2]

22. Let the speed of the train be x km/hr.

According to question,

$\frac{90}{x} - \frac{90}{x+15} = \frac{1}{2}$ [1]

i.e. $x^2 + 15x - 2700 = 0$ [1]

Solving for x we get,

$x = -60$ or 45 [1]

Rejecting $x=-60$, we get, $x=45$

So, $x=45$ km/hr [1/2]

Time = Distance / Speed

$= \frac{90}{45}$

$= 2$ hours [1/2]

23. (i) Cards marked with numbers which are multiples of 3 are 3, 9, 15, 21, 27, 33, 39 and 45.

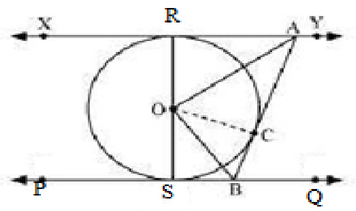
So, P (getting a number divisible by 3) = $\frac{8}{25}$ [1]

(ii) P (composite number) = $\frac{10}{25}$ [1]

(iii) P (not a perfect square) = 1 – P (perfect square) = $1 - \frac{4}{25} = \frac{21}{25}$ [1]

(iv) P (multiple of 3 and 5) = $\frac{2}{25}$ [1]

24.



Construction: Join OR, OC and OS. [1/2]

In ΔORA and ΔOCA

OR = OC (radii)

AO=AO (common)

AR= AC (tangents from an external point)

$\Delta ORA \cong \Delta OCA$ (By SSS rule) [1]

$\therefore \angle RAO = \angle CAO$ (CPCT) …………….. (1) [1/2]

Similarly $\Delta OSB \cong \Delta OCB$ (By SSS rule)

$\therefore \angle SBO = \angle CBO$ (CPCT) ……………………..(2) [1/2]

$\angle RAB + \angle SBA = 180°$ (Co- interior angles)

$2\angle OAB + 2\angle OBA = 180°$ (From (1) & (2)

$\angle OAB + \angle OBA = 90°$ ………………… (3) [1]

In ΔAOB,

$\angle OAB + \angle OBA + \angle AOB = 180°$ (Angle sum property)

$90° + \angle AOB = 180°$ (From 3)

$\angle AOB = 90°$ [1/2]

25. Quadratic formula, $x = \frac{-b \pm \sqrt{b^2-4ac}}{2a}$ [1]

$a = p^2$, $b = (p^2 - q^2)$, $c = -q^2$ [1/2]

$x = [-(p^2 - q^2) \pm \sqrt{[(p^2 - q^2)^2 - 4p^2(-q^2)]}] / 2p^2$ [1]

$x = [-p^2 + q^2 \pm (p^2 + q^2)] / 2p^2$ [1/2]

$x = q^2/p^2$ or -1 [1]

26. Diagonals of a parallelogram bisect each other,

So, midpoint of AC = midpoint of BD [1/2]

i.e. $\left(\frac{1+k}{2}, \frac{2-2}{2}\right) = \left(\frac{2-4}{2}, \frac{3-3}{2}\right)$ [1/2]

i.e. $\frac{(1+k)}{2} = -1$

i.e. $k = -3$ [1/2]

Now ar ABCD= 2 Area of ΔABD

$= 2 \times \frac{1}{2} \times [1(6) + 2(-1) - 4(-5)]$

$= 24$ sq units. [1]

$AB = \sqrt{(1-2)^2 + (-2-3)^2}$

$= \sqrt{26}$ units [1/2]

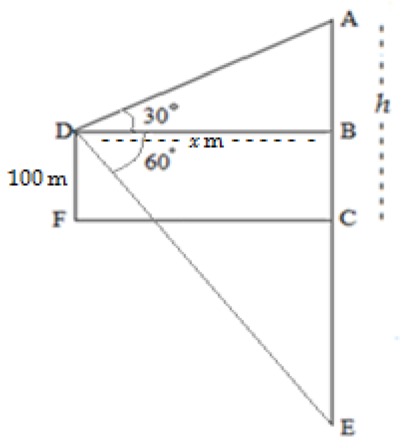
Ar (ABCD) = base x height

= AB x h

So, $24 = \sqrt{26} \times h$

So, $h = 24/\sqrt{26}$ units [1]

27.



Let FC be the lake and D be a point 100m above the lake.

Let A be the helicopter at height *h* metre above the lake and let E be its reflection $\therefore$ CE = *h* metre

$\angle BDE = 60°$, $\angle ADB = 30°$ and DB = *x* metre [**1 mark** for correct figure and description]

$\tan 30° = \frac{h-100}{x}$

$1/\sqrt{3} = \frac{h-100}{x}$

h = x/$\sqrt{3}$ + 100 ------------------------------ (1) [1]

Tan 60° = $\frac{h+100}{x}$

$\sqrt{3}$ x = h+100

$h = \sqrt{3}x$ - 100 ------------------------------ (2) [1]

From equation 1 & 2

x/$\sqrt{3}$ + 100 = $\sqrt{3}x$ - 100

x = 100$\sqrt{3}$m

and so h=200m [1]

i.e. height of the helicopter is 200m.

28. (i) Volume of each container = $\frac{1}{3}\pi h({r_1}^2 + {r_2}^2 + r_1 r_2)$ [1/2]

$= \frac{1}{3}\times\frac{22}{7}\times 30(20^2 + 40^2 + 20\times40)$

$= 88000 cm^3$= 88 l [1]

Total milk = 880 l

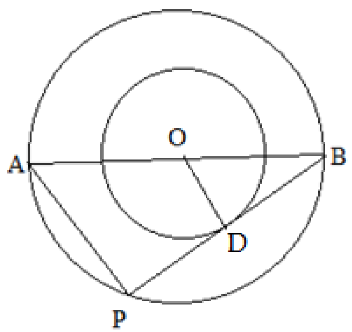
a) Milk in 1 container= 88 l

So number of containers =$\frac{880}{88}$ = 10 [1]

b) Cost = 880×35 = Rs.30800 [1/2]

c) Any relevant Value inculcated [1]

29.



[Correct Figure 1 mark]

$\angle APB$=90° (angle in a semicircle)

$\angle ODB$=90° (tangent is perpendicular to the radius)

ΔAPB and ΔODB

$\angle APB = \angle ODB$=90° [1/2]

$\angle ABP = \angle OBD$ (common) [1/2]

ΔAPB ~ ΔODB (AA) [1/2]

$\therefore \frac{OD}{AP} = \frac{OB}{AB}$ (CPST) [1/2]

$\frac{8}{AP} = \frac{13}{26}$ [1/2]

AP = 16cm [1/2]

30. (i) a_3 = 600 $\therefore$ a + 2d= 600 ---------------- (1) [1/2]

a_7 = 700 $\therefore$ a + 6d= 700 ---------------(2) [1/2]

From (1) & (2)

d = 25 , a= 550

(i) $a_{1=}$ = 550 [1]

(ii) a_{10} = a + 9d= 550 + 9 × 25 = 775 [1]

(iii) $S_7 = \frac{7}{2}(2\times550 + 6\times25)$

= 4375 [1]

31. r =7cm,h = 50 × 0.5 = 25cm [1/2]

Total Surface Area = $2\pi r\,(r + h)$ [1/2]

$= 2 \times \frac{22}{7} \times 7 \times (7 + 25)$

= 1408 cm^2 [1]

Volume of the box = 25 ×25 × 25 = 15625 cm^3 [1/2]

Volume of the solid formed = $\pi r^2 h$ [1/2]

$= \frac{22}{7} \times 7 \times 7 \times 25 = 3850$ cm^3 [1/2]

Space left = 15625 – 3850 = 11775 cm^3 [1/2]

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