SAMPLE QUESTIONS
MATHEMATICS (047)
S.A.-II (2012-13)
CLASS-X

MCQ- 1 Mark

Q.1 The tenth term of an A.P. –1.0, –1.5, –2.0, ... is

(a) 3.5 (b) 5.5

(c) –5.5 (d) –6.5

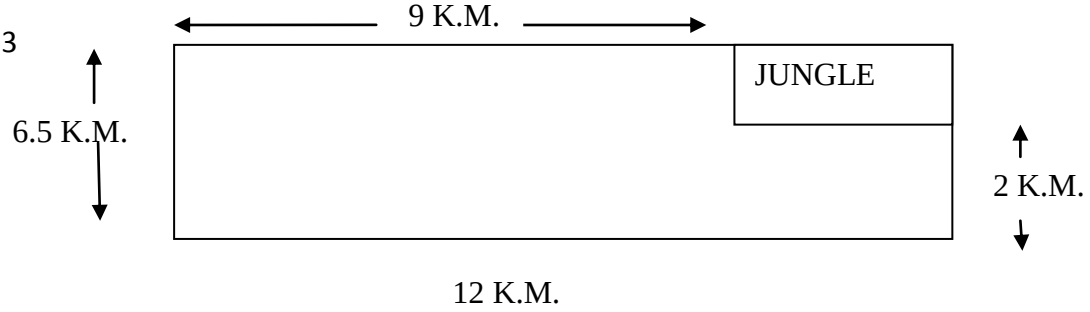
Q.2 A sphere and a cone of height 'h' have the same radius and same volume, then r: h is

(a) 4:1 (b) 1:4

(c) 16:1 (d) 1:16

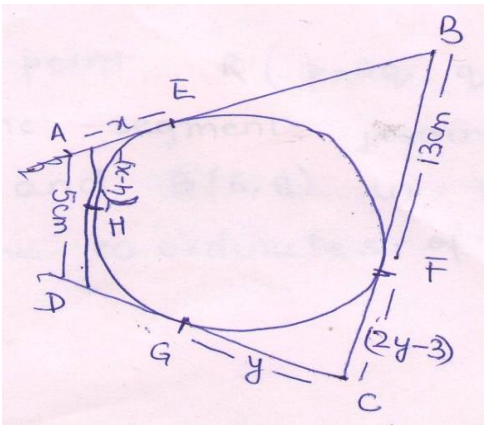
SA-II - 2 Marks

Q.3



A helicopter has to make an emergency landing as shown in the figure. What is the probability of a safe landing?

Q.4.



In the figure, quadrilateral ABCD circumscribes the circle. Find the length of the side CD.

SA-III - 3 Marks

Q.5 The sum of first, third and seventeen term of an A.P. is 216. Find the sum of the first 13 terms of the A.P.

Q.6 The point R (p-3q, q) divides the line segment joining the points A (3, 5) and B (6, 8) in the ratio 2:1. Find the co-ordinates of R.

Q.7 Draw a triangle ABC with side BC= 7cm, AB= 6cm and ∠ABC = 60°. Construct a triangle whose sides are $\frac{3}{4}$ of the corresponding sides of Δ ABC. Also write steps of construction.

LA - 4 Marks

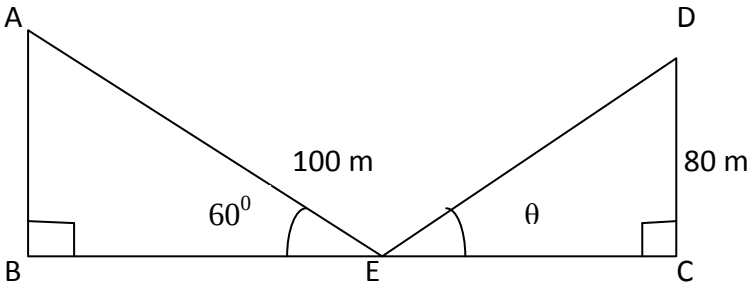
Q.8 A cone of height 3.25 cm is surmounted by a hemisphere having same base. If the diameter of the base is 3.5 cm, then find the curved surface area. (Take π = $\frac{22}{7}$)

Q.9 If the sum of the roots of the equation

$$Kx^2 - 2\sqrt{2x} + 1 = 0$$

is $\sqrt{2}$, then find the roots of the equation.

Q.10



In Δ DCE

$$\tan\theta - \tan(90 - \theta) = 0$$

Also AE = 100 m and DC = 80 m.

Find BC.

ANSWER KEY

1. (c)
2. (b)

3. Length of a Jungle = (12 – 9) km = 3 km

   Breadth of a Jungle = (6.5 –2) km = 4.5 km } $\left(\frac{1}{2}\right)$

   Area of Jungle = 13.5 sq. km

   Area of Total field = 12 x 6.5 = 78 sq. km $\left(\frac{1}{2}\right)$

   P (Safe landing) = $\frac{(78 - 13.5)}{78}$

   = $\frac{64.5}{78}$

   = $\frac{43}{52}$ (1)

4. AE = AH (length of tangents from external points are equal)

   x = 4 – x

   2x = 4

   x = 2

   DH = (5 – 2) = 3 cm

   DH = DG = 3 cm (1)

   CF = CG

   2y – 3 = y $\left(\frac{1}{2}\right)$

   y = 3

   DC = DG + GC = 3 + 3 = 6 cm $\left(\frac{1}{2}\right)$

5. a + a + 2d + a + 16d = 216 (1)

   3a + 18d = 216

   a + 6d = 72 $\left(\frac{1}{2}\right)$

   $S_{13} = \frac{13}{2}\left(2a + (13 - 1)\, d\right)$

   $= \frac{13}{2}\left(2a + 12d\right)$ $\left(\frac{1}{2}\right)$

$= \frac{13}{2} \times 2\left[a + 6d\right]$

$= 13 \times 72$

$= 936$ (1)

6. $p - 3q = \frac{2\,x\,6+1\,x\,3}{2+1}$

$p - 3q = \frac{12+3}{3}$

$p - 3q = 5$ (1) (1 mark)

Also $q = \frac{2\,x\,8+1\,x\,5}{2+1}$

$q = \frac{16+5}{3} = \frac{21}{3} = 7$ (2) (1 mark)

∴ Substituting (2) in (1) we get

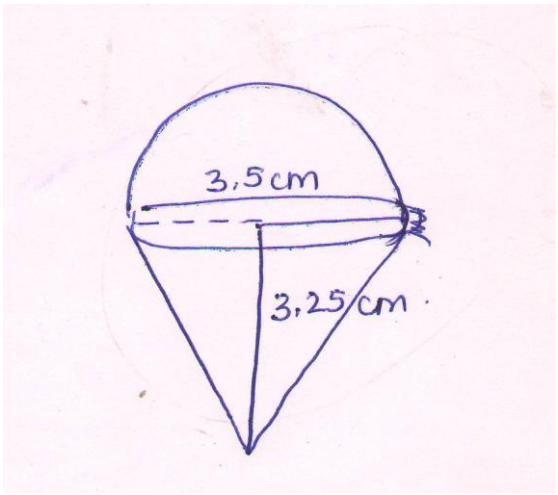
$p - 3 \times 7 = 5$

$p = 26$ (1 mark)

7. correct construction (2 marks)

Steps of construction (1 mark)

8.



Curved surface area of the hemisphere $= \frac{1}{2}(4\pi r^2)$

$= (2 \times \frac{22}{7} \times \frac{3.5}{2} \times \frac{3.5}{2})\ cm^2$ (1 mark)

Slant height of the cone (l) = $\sqrt{r^2 + h^2} = \sqrt{\frac{(3.5)^2}{(2)^2} + (3.25)^2}$

= 3.7 cm (approx.) (1 mark)

CSA of cone = πrl = $\frac{22}{7}$ x $\frac{3.5}{2}$ x 3.7 cm^2 (1 mark)

Total Curved Surface Area = $\frac{22}{7}$ x $\frac{3.5}{2}$ (3.5 + 3.7) cm^2

= $\frac{11}{2}$ x 7.2 = 39.6 cm^2 (approx.) (1 mark)

9. Sum of the roots = $\frac{-b}{a}$

$\sqrt{2} = \frac{2\sqrt{2}}{k}$

K = 2 (1)

Now the quadratic equation is

$2x^2 - 2\sqrt{2}\,x + 1 = 0$

$D = b^2 - 4ac = 8 - 8 = 0$ (1)

Roots are real and equal

$x = \frac{2\sqrt{2} \pm \sqrt{0}}{4}$

$= \frac{\sqrt{2}}{2} = \frac{1}{\sqrt{2}}$

∴ Roots are $\frac{1}{\sqrt{2}}, \frac{1}{\sqrt{2}}$ (2)

10. $\tan\theta = \tan(90 - \theta)$

$\tan\theta = \cot\theta$

$\rightarrow \theta = 45°$ (1)

In Δ DCE

$\tan 45° = \frac{80}{EC}$

EC = 80 m (1)

In Δ ABE

$\frac{B}{H}$ = cos 60°

$\frac{BE}{100} = \frac{1}{2}$

BE = 50 (1)

∴ BC = BE + EC

= 50 + 80

= 130 m (1)

VALUE BASED QUESTIONS
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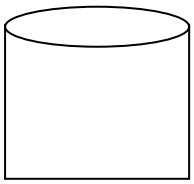
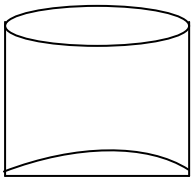
Ramesh, a juice seller has set up his juice shop. He has three types of glasses of inner diameter 5 cm to serve the customers. The height of the glasses is 10 cm.(use $\pi = 3.14$)



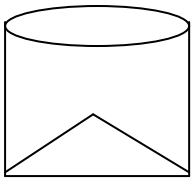
Type A

- A glass with a plane bottom.



Type B

- A glass with hemispherical raised bottom.



Type C

- A glass with conical raised bottom of height 1.5 cm.

He decided to serve the customer in "A" type of glasses.

1. Find the volume of glass of type A.
2. Which glass has the minimum capacity?
3. Which mathematical concept is used in above problem?
4. By choosing a glass of type A, which value is depicted by juice seller Ramesh?

ANSWER KEY

1. Diameter = 5 cm
   radius = 2.5 cm
   height = 10 cm

   Volume of glass of type A = $\pi r^2 h$

   $= 3.14 \times 2.5 \times 2.5 \times 10$

   $= 196.25 \text{ cm}^3$

   Volume of hemisphere = $\frac{2}{3}\pi r^3$

   $= \frac{2}{3} \times 3.14 \times 2.5 \times 2.5 \times 2.5$

   $= 32.71 \text{ cm}^3$

   ∴ Volume of glass of type B = 163.54 cm^3

   Volume of cone = $\frac{1}{3} \pi r^2 h$

   $= \frac{1}{3} \times 3.14 \times 2.5 \times 2.5 \times 1.5$

   $= 3.14 \times 2.5 \times 2.5 \times 0.5$

   $= 9.81 \text{ cm}^3$

   Volume of glass of type C = 196.25 – 9.81

   $= 186.44 \text{ cm}^3$

(1) The volume of glass of type A = 196.25 cm^3.

(2) The glass of type B has the minimum capacity of 163.54 cm^3.

(3) Volume of solid figures (Mensuration)

(4) Honesty