ACE OF PACE – SAMPLE PAPER
ENGINEERING
Grade X moving to XI

SOLUTIONS

Section – I

1. (A)

Required area $= \frac{1}{2}\left[1(3+4)-2(-4-2)-3(2-3)\right]$

$= \frac{1}{2}\left[7+12+3\right]$

$= \frac{1}{2}\times 22 = 11$

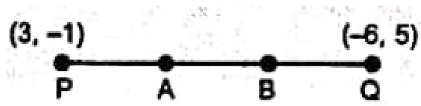
2. (B)

Since the line segment AB is trisected

$\therefore$ $PB:BQ = 2:1$

$\therefore$ Coordinates of B are $= \left(\frac{2(-6)+1(3)}{2+1}, \frac{2(5)+1(-1)}{2+1}\right)$

$= \left(\frac{-12+3}{3}, \frac{10-1}{3}\right) = \left(-\frac{9}{3}, \frac{9}{3}\right) = (-3, 3)$



3. (A)

4. (B)

5. (C)

From the given,

$\angle OSQ = \angle OQS = 90° - 50° = 40°$

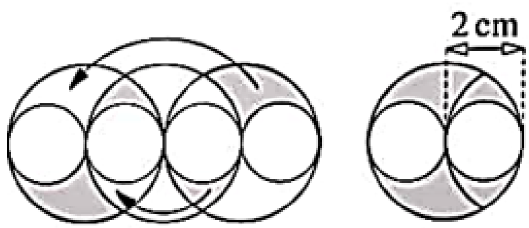
and $\angle RSO = \angle SRO = 90° - 60° = 30°$

Therefore, $\angle QSR = 40° + 30 = 70°$

6. (B)

If the shaded pieces on the right-hand side are reflected in a central vertical line, the total shaded area is then the area of one large circle minus the areas of two small circles. The radius of each large circle is 2 cm so the shaded area, in cm^2, equals

$\pi\times 2^2 - 2\times\pi\times 1^2 = 4\pi - 2\pi = 2\pi$.



7. (B)

In ΔABC and ΔDEF,

$\angle B = \angle E, \angle F = \angle C$ and AB = 3DE

By AA similarly criterion,

$\Delta ABC \sim \Delta DEF$

AB = 3DE

$\Rightarrow \frac{AB}{DE} = 3$

$\Rightarrow \frac{AB}{DE} = \frac{BC}{EF} = \frac{AC}{DF} = 3$

For triangles to be congruent, the ratio of sides must be 1.

Therefore, triangles are similar but not congruent.

8. (B)

As per the given question,

$x_{mean} = \frac{\sum f_i x_i}{\sum f_i}$

$7.5 = \frac{120 + 3k}{30}$

$225 = 120 + 3k$

$3k = 105$

$3k = 105$

$k = 35$

9. (B)

AB = 24 cm and BC = 7 cm

$\tan C =$ opposite side / Adjacent side

$\tan C = \frac{24}{7}$

10. (C)

$\sin 30° = \frac{1}{2}, \sin 60° = \frac{\sqrt{3}}{2}, \cos 30° = \frac{\sqrt{3}}{2}$ and $\cos 60° = \frac{1}{2}$

Putting these values, we get:

$\left(\frac{1}{2} + \frac{1}{2}\right) - \left(\frac{\sqrt{3}}{2} + \frac{\sqrt{3}}{2}\right)$

$= 1 - \left[\left(2\sqrt{3}\right)/2\right]$

$= 1 - \sqrt{3}$

11. (A)

Given that in a right triangle ABC, $\angle C = 90°$.

We know that the sum of the three angles is equal to $180°$.

$\angle A + \angle B + \angle C = 180°$

$\angle A + \angle B + 90° = 180° \quad (\because \angle C = 90°)$

$\angle A + \angle B = 90°$

Now, $\cos(A + B) = \cos 90° = 0$

12. (B)

$\tan 1^\circ \tan 2^\circ \tan 3^\circ ..... \tan 89^\circ$

$= [\tan 1^\circ \tan 2^\circ ..... \tan 44^\circ] \tan 45^\circ [\tan(90^\circ - 44^\circ) \tan(90^\circ - 43^\circ) ... \tan(90^\circ - 1^\circ)]$

$= [\tan 1^\circ \tan 2^\circ .... \tan 44^\circ][\cot 44^\circ \cot 43^\circ .... \cot 1^\circ] \times [\tan 45^\circ]$

$= [(\tan 1^\circ \times \cot 1^\circ)(\tan 2^\circ \times \cot 2^\circ) ... (\tan 44^\circ \times \cot 44^\circ)] \times [\tan 45^\circ]$

$= 1 \times 1 \times 1 \times 1 \times ... \times 1$ {since $\tan A \times \cot A = 1$ and $\tan 45^\circ = 1$}

= 1

13. (D)

We know that, $\sin^2\theta + \cos^2\theta = 1$

Taking cube on both sides,

$(\sin^2\theta + \cos^2\theta)^3 = 1$

$(\sin^2\theta)^3 + (\cos^2\theta)^3 + 3\sin^2\theta\cos^2\theta(\sin^2\theta + \cos^2\theta)$

= 1

$\sin^6\theta + \cos^6\theta + 3\sin^2\theta\cos^2\theta = 1$

14. (A)

We can write it as

$5^{(x+3)} = 5^{2(3x-4)}$ or $x + 3 = 2(3x - 4)$

$x + 3 = 6x - 8$ or $5x = 11$

So, $x = \frac{11}{5}$

15. (B)

Given ratio is 1 : 2 : 3

So, the numbers will be 1a : 2a : 3a

Then, $a^3 + 8a^3 + 27a^3 = 4500$

$36a^3 = 4500$

or, $a^3 = \frac{4500}{36} = 125$

16. (B)

$\Rightarrow$ The equations have no solution when their slopes are same

$\Rightarrow$ Slope of equation 2 = 21/k

$\Rightarrow$ So, 21/k = –7/4

$\therefore$ The value of k is –12.

Section – II : Challenging Questions

17. (A)

In this type of question, we need to find out the LCM of the given numbers.

LCM of 12, 15, 18 and 20;

$12 = 2 \times 2 \times 3$;

$15 = 3 \times 5$;

$18 = 2 \times 3 \times 3$;

$20 = 2 \times 2 \times 5$;

Hence, LCM $= 2 \times 2 \times 3 \times 5 \times 3$
Since, the soldiers are in the form of a solid square.
Hence, LCM must be a perfect square. To make the LCM a perfect square.
We have to multiple it by 5.
Hence, The required number of soldiers
$= 2 \times 2 \times 3 \times 3 \times 5 \times 5$
= 900

18. (C)
96 / (x – 4) = 96 / x + 4
$\Rightarrow$ 96x = 96(x – 4) + 4x(x – 4)
$\Rightarrow$ 96x = 96x – 384 + $4x^2$ – 16x
$\Rightarrow$ $4x^2 - 16x - 384 = 0$
$\Rightarrow$ $x^2 - 4x - 96 = 0$
Solving the quadratic equation:
$\Rightarrow$ x = [4 + 20] / 2 = 12 or x = [4 – 20] / 2 = –8
(not possible)
Therefore, x = 12.
The number of students who attended the trip = 12 – 4 = 8.
$\therefore$ The number of students who attended the trip was 8.

19. (A)
Given ration 7 : 9
So, let the numbers be 7a and 9a.
According to the question -
$7a \times 9a = 1575$
$63a^2 = 1575$
$a^2 = \frac{1575}{63}$
or $a^2 = 25$
and $a = 5$
So, the two numbers will be -
$7a = 7 \times 5 = 35$
and $9a = 9 \times 5 = 45$
Hence, the greater number is 45 between the given numbers.

20. (B)

Class	–0.5 – 5.5	5.5 – 11.5	11.5 – 17.5	17.5 – 23.5	23.5 – 29.5
Frequency	13	10	15	8	11
Cumulative frequency	13	23	38	46	57

$\frac{N}{2} = \frac{57}{2} = 28.5$
28.5 lies in between the interval 11.5 – 17.5.
Thus, the median class is 11.5 – 17.5.
Therefore, the upper limit of the median class is 17.5.