10th - CBSE

CT - 1M

Solution

4th Aug '18

## Section: A

1) one

2) By AAA similarity criterion
$\Delta ABC \sim \Delta QPR$

3) median = 20.5

4) $a \times b = LCM(a, b) \times HCF(a, b)$
$a \times 48 = 12 \times 240$
$\therefore a = \frac{12 \times 240}{48}$
$\therefore \boxed{a = 60}$

5) $k(x^2 - (\alpha+\beta)x + \alpha\beta)$
$= k(x^2 - \frac{1}{4}x - 1)$
$= \frac{1}{4}k(4x^2 - x - 4)$

## Section: B

6) let a be ~~the~~ any positive integer & $b = 3$.
Applying Euclid's division lemma with a & b,

$a = 3q + r \quad , \quad 0 \leq r < 3.$

$a = 3q + 0$ or $a = 3q + 1$ or $a = 3q + 2$.

$\therefore a = 3q$ or $3q+1$ or $3q+2$ for some integer $q$

7) $a = 28 - 15 = 13$

$b = 43 - 28 = 15$

$d = 61 + 9 = 70$

$c = 80 - 70 = 10$

8) $$\frac{\cos 45^\circ - 2\cos 60^\circ}{\sin 45^\circ + 2\cos 60^\circ} = \frac{1/\sqrt{2} - 2(1/2)}{1/\sqrt{2} + 2(1/2)}$$

$$= \frac{1/\sqrt{2} - 1}{1/\sqrt{2} + 1}$$

$$= \frac{1-\sqrt{2}}{1+\sqrt{2}} \times \frac{1-\sqrt{2}}{1-\sqrt{2}}$$

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

$$= \frac{3 - 2\sqrt{2}}{-1}$$

$$= 2\sqrt{2} - 3.$$

9) $$\frac{AD}{DB} = \frac{AE}{EC} = \frac{3}{4}$$

$$\therefore \frac{AE}{AC - AE} = \frac{3}{4}$$ $\because$ $AE - AE = EC$

$$4AE = 3AC - 3AE$$

$$7AE = 3 \times 14$$

$$\boxed{AE = 6\text{cm}}$$

# Section : C

10) let us assume to the contrary that $\sqrt{3}$ is an irrational.

i.e. $\sqrt{3} = \frac{a}{b}$ , a & b are coprimes.

$\sqrt{3} = \frac{a}{b}$

$3 = \frac{a^2}{b^2}$ ∵ Squaring on both sides,

$3b^2 = a^2$

$\Rightarrow 3 | a^2$

$\Rightarrow 3 | a$ —— (i) ∵ If $p | a^2$ then $p | a$.

$\Rightarrow a = 3c$ for some int. c.

$a^2 = 9c^2$

$\Rightarrow 3b^2 = 9c^2$

$\Rightarrow b^2 = 3c^2$

$\Rightarrow 3 | b^2$

$\Rightarrow 3 | b$. —— (ii) ∵ If $p | a^2$ then $p | a$.

∴ from (i) & (ii) a & b have atleast 3 as a common factor. But this contradicts that a & b are coprimes.

∴ Our assumption is false

∴ $\sqrt{3}$ is an irrational.