Std. - 9th (CBSE) 19th June '17

Solution of PT-2M (Maths)

Lines & Angles, Algebric expressions

Section - A

(1) Let x be the angle which is complement to itself.

i.e. $x = 90^\circ - x$

$\therefore x + x = 90^\circ$

$\therefore 2x = 90^\circ$

$\therefore x = 45^\circ$

(2) $x^3 + y^3 = (x+y)^3 - 3xy(x+y)$

(3) $x^2 - 3x + 2 = x^2 - x - 2x + 2$

$= x(x-1) - 2(x-1)$

$\therefore x^2 - 3x + 2 = (x-1)(x-2)$

(4) From figure, $\angle ACD$ & $\angle ACB$ are linear pair of angles.

$\therefore \angle ACD + \angle ACB = 180^\circ$

$\therefore 150^\circ + \angle ACB = 180^\circ$

$\therefore \angle ACB = 180^\circ - 150^\circ$

$\therefore \angle ACB = 30^\circ$

→ Now, for ΔABC we have,

$\angle ACB + \angle ABC + \angle BAC = 180^\circ$

$\therefore 30^\circ + x + x = 180^\circ$

$\therefore 2x = 150^\circ$

$\therefore \boxed{x = 75^\circ}$

(5) (i) $\angle AOD$ & $\angle DOC$

(ii) $\angle DOC$ & $\angle COB$

(6) Reflex angle of $80^\circ = 360^\circ - 80^\circ$

$= 280^\circ$

Section : B

(7) $a : b = 2 : 3$

$\therefore \frac{a}{b} = \frac{2}{3}$

$\therefore$ Let, $a = 2K$, $b = 3K$ ——(i)

→ $\angle POY + \angle POX = 180^\circ$ $\because$ | Linear pair of angles

$90^\circ + \angle POX = 180^\circ$

$\therefore \angle POX = 90^\circ$

$\therefore a + b = 90^\circ$ $\because$ | $\angle POX = a + b$

$\therefore 2K + 3K = 90^\circ$ $\because$ | by (i)

$\therefore 5K = 90^\circ$

$\therefore K = 18^\circ$

→ Now, $b = 3K = 3(18^\circ) = 54^\circ$

Also, $\angle MOX + \angle XON = 180^\circ$ $\because$ (Linear pair of angles)

$b + \angle XON = 180^\circ$

$54^\circ + c = 180^\circ$

$\therefore c = 180^\circ - 54^\circ$

$\therefore \boxed{c = 126^\circ}$

(8) $\left(\frac{1}{4}a - \frac{1}{2}b + 1\right)^2$

$= \left(\frac{1}{4}a\right)^2 + \left(-\frac{1}{2}b\right)^2 + (1)^2 + 2\left(\frac{1}{4}a\right)\left(-\frac{1}{2}b\right) + 2\left(-\frac{1}{2}b\right)(1) + 2(1)\left(\frac{1}{4}a\right)$

$= \frac{1}{16}a^2 + \frac{1}{4}b^2 + 1 - \frac{1}{4}ab - b + \frac{1}{2}a$

Section-C

(9) let $f(x) = x^3 - 6x^2 + 11x - 6$

Constant term in $f(x) = -6$

$\therefore$ factors of $-6 = \pm 1, \pm 2, \pm 3, \pm 6$.

$\rightarrow f(1) = 1^3 - 6(1)^2 + 11(1) - 6 = 12 - 12 = 0$

$\therefore x=1$ is a root of $f(x)$.

$\rightarrow f(2) = (2)^3 - 6(2)^2 + 11(2) - 6 = 30 - 30 = 0$

$\therefore x=2$ is a root of $f(x)$.

$\rightarrow f(3) = (3)^3 - 6(3)^2 + 11(3) - 6 = 60 - 60 = 0$

$\therefore x=3$ is a root of $f(x)$.

$\therefore 1, 2, 3$ are the roots of $f(x)$.

(10) $f(x) = x^3 + 13x^2 + 32x + 20$

Constant term of $f(x) = 20$

$\therefore$ factors of $20 = \pm 1, \pm 2, \pm 4, \pm 5, \pm 10, \pm 20$.

$\rightarrow f(-1) = (-1)^3 + 13(-1)^2 + 32(-1) + 20 = 33 - 33 = 0$

$\therefore (x+1)$ is a factor of $f(x)$.

$f(-2) = (-2)^3 + 13(-2)^2 + 32(-2) + 20 = 72 - 72 = 0$

$\therefore (x+2)$ is a factor of $f(x)$.

$f(-3) = (-3)^3 + 13(-3)^2 + 32(-3) + 20 \neq 0$

$\therefore (x+3)$ is not a factor of $f(x)$.

$f(-4) = (-4)^3 + 13(-4)^2 + 32(-4) + 20 \neq 0$

$\therefore (x+4)$ is not a factor of $f(x)$.

$f(-5) = (-5)^3 + 13(-5)^2 + 32(-5) + 20 \neq 0$

$\therefore (x+5)$ is not a factor of $f(x)$.

$f(-10) = (-10)^3 + 13(-10)^2 + 32(-10) + 20 = -1000 + 1300 - 320 + 20$
$= 0$

$\therefore (x+10)$ is a factor of $f(x)$.

So, we have three linear factors for $f(x)$ & $\deg(f(x)) = 3$.