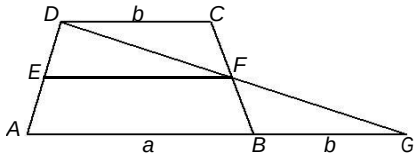
Solutions

1. (d) Linear expression divided by $(1 + a + a^5)$ and $(1 + a^4 + a^5)$ individually only if the highest power of A is 10 (I .E. 5 + 5) and 9 (I .E. 5 + 4) both are positive. Clearly, in options (a) and (c), the highest power of A is 8. So, these options are not correct. Now, we have option (d) in which both a^{10} and a^9 are positive.

2. (b)

3. (c)

4. (c) Let $ABCD$ be a trapezium with the bases AB and DC and the mid line EF. Let us draw the straight line DF through the points D and F till the intersection with the extension of the straight line AB at the point G. Compare the ΔDFC and ΔFBG.



The segments FC and BF are congruent, since the point F is the mid point of the side BC.

$\therefore \angle DFC = \angle BFG$ [vectically opposite angles]

The $\angle DCF$ and $\angle FBG$ are congruent as the alternate exterior angles at the parallel lines AB and DC and the transverse BC.

$\therefore \quad \Delta DFC \cong \Delta FBG$ [by ASA]

$\Rightarrow \quad DF = GF$ [by CPCT]

Thus, the mid line EF of the trapezium $ABCD$ is the straight line segment connecting the mid-points of the ΔAGD. We know that the straight line segment connecting the mid points of the ΔAGD is parallel to the triangle base AG and its length is half of the length of the triangle base. In this case, the length of the segment EF is half of the length AG : $|EF| = 1/2 \times |AG|$

$= 1/2 \times (|AB| + |BG|)$. Since, $|BG| = |DC|$ from the triangles congruency, we have

$|EF| = 1/2 \times (|AB| + |DC|)$ or $|EF| = 1/2 \times (a + b)$, where a and b are the lengths of the trapezium bases.

5. (b) Given, $AD = CD$

$\Rightarrow \quad \angle ABD = \angle CBD$

$\Rightarrow \quad 2x = x + 40$

$\Rightarrow \quad x = 40°$

6. (a)

7. (d) We have, 5, 6, 6, 7, 9

Here, $n = 5$ [odd]

$\therefore \quad M = \frac{n+1}{2}$ TH term

$= \frac{5+1}{2} = \frac{6}{2} = 3$RD term

x = Median = 6

Hence, $x + 3 = 6 + 3 = 9$, which corresponds to Thursday.

8. (a) Given, $P(E) = \frac{1}{14}$

Let x be the number of tickets bought.

$\Rightarrow \quad \frac{x}{70} = \frac{1}{14}$

$\Rightarrow \quad x = 5$

9. (d) $\left(x^{1/a^{\frac{a^2b^2}{b-a}}}\right) \times \left(x^{1/b^{\frac{b^2c^2}{c-b}}}\right) \times \left(x^{1/a^{\frac{a^2c^2}{a-c}}}\right)$

$= \left(x^{\frac{1}{a}\cdot\frac{a^2b^2}{b-a}}\right) \times \left(x^{\frac{1}{b}\cdot\frac{b^2c^2}{c-b}}\right) \times \left(x^{\frac{1}{a}\cdot\frac{a^2c^2}{a-c}}\right)$

$\left[\because \frac{a^m}{a^n} = a^{m-n}\right]$

$= \left(x^{\frac{b-a}{ab}\cdot\frac{a^2b^2}{b-a}}\right) \times \left(x^{\frac{c-b}{bc}\cdot\frac{b^2c^2}{c-b}}\right) \times \left(x^{\frac{a-c}{ac}\cdot\frac{a^2c^2}{a-c}}\right)$

$= x^{ab} \times x^{bc} \times x^{ca}$

$= x^{ab+bc+ca}$ $[\because a^m \times a^n = a^{m+n}]$

10. (a) Volume of largest box = 4 × 5 × 3 = 60

According to the question,

$(4 + x)(5 + x)(3 + x) = 120$

$\Rightarrow \quad x^3 + 12x^2 + 47x + 60 = 120$

$\Rightarrow \quad x^3 + 12x^2 + 47x - 60 = 0$

which is the new expression.

11. (a) We know that,

$\angle BOC = 90° + \frac{1}{2}\angle A$

and $\angle BOC = 90° - \frac{1}{2}\angle A$

$\Rightarrow \quad \angle BOC - \angle BOC = \angle A$

$\therefore \quad \angle BOC = \angle BOC + \angle A$

12. (b) Since, $\angle AOC = \angle BOC$ [vertically opposite]

In ΔOBD,

$\angle BOD + \angle BDO + \angle OBD = 180°$

$\Rightarrow \quad x + 32° + x + 14° + 90° = 180°$

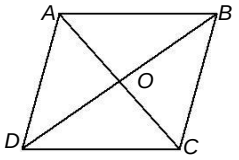
$[\because \angle BOD = \angle BOC + \angle COD]$

$\Rightarrow \quad 2x + 136° = 180°$

$\Rightarrow \quad 2x = 44°$

$\therefore \quad x = 22°$

13. (a) Since, $ABCD$ is a rhombus, so its all sides are equal.



Now, $BC = DC$

In ΔBDC,

$\angle BDC = \angle DBC = x°$

Also, $\angle BCD = 60°$ [given]

$\therefore \quad x + x + 60° = 180°$

$\Rightarrow \quad x = 60°$

$\therefore \angle BDC = \angle DBC = \angle BCD = 60°$

So, ΔBCD is an equilateral triangle.

$\therefore BD = BC = a$

$AB^2 = OA^2 + OB^2$

[Qdiagonals of rhombus intersect each other at 90°]

$\therefore OA^2 = AB^2 - OB^2$

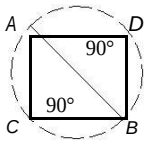
$\therefore OA^2 = a^2 - \left(\frac{a}{2}\right)^2 = a^2 - \frac{a^2}{4} = \frac{3a^2}{4}$

$\therefore OA = \frac{\sqrt{3}}{2}a$

Now, $AC = 2 \times \frac{\sqrt{3}}{2}a = \sqrt{3}a$

$\therefore AC : BD = \sqrt{3}a : a = \sqrt{3} : 1$

14. (c)



15. (a) Area swept by the minute hand

$= \pi r^2 \times \frac{35}{60}$

$= \frac{22}{7} \times \frac{x}{2} \times \frac{x}{2} \times \frac{35}{60} = \frac{11}{24}x^2$

16. (d) A. Sample space = 15

Number of favourable outcomes = 3

$\therefore P$ (having a chocolate doughnut) $= \frac{3}{15} = \frac{1}{5}$

B. Sample space = 14

Number of favourable outcomes = 7

$\therefore P$ (target is hit) $= \frac{7}{14} = \frac{1}{2}$

C. Sample space = 15

$\therefore P$ (not having vanilla) $= 1 - \frac{3}{5} = \frac{4}{5}$

17. (d) Consider $\frac{7\sqrt{2}}{3+\sqrt{2}} = \frac{7\sqrt{2}(3-\sqrt{2})}{2(3+\sqrt{2})(3-\sqrt{2})} = \frac{7\sqrt{2}(3-\sqrt{2})}{(3^2-2)}$

$= \frac{21\sqrt{2} - 14}{9-2}$

$= \frac{21\sqrt{2} - 14}{7}$

$= 3\sqrt{2} - 2$

Now, $\frac{2\sqrt{5}}{\sqrt{6}+\sqrt{5}} = \frac{2\sqrt{5}(\sqrt{6}-\sqrt{5})}{(\sqrt{6}+\sqrt{5})(\sqrt{6}-\sqrt{5})} = \frac{2\sqrt{5}(\sqrt{6}-\sqrt{5})}{(\sqrt{6})^2-(\sqrt{5})^2}$

$= 2\sqrt{30} - 10 = 2\sqrt{30} - 10$

$6 - 5$

$\therefore \frac{3\sqrt{2}}{\sqrt{15}+3} = \frac{3\sqrt{2}(3\sqrt{2}-\sqrt{15})}{2(3\sqrt{2}+\sqrt{15})(3\sqrt{2}-\sqrt{15})}$

$= \frac{3\sqrt{2}(3\sqrt{2}-\sqrt{15})}{(\sqrt{2})^2-(\sqrt{15})^2} = \frac{3\sqrt{2}(3\sqrt{2}-\sqrt{15})}{3\times 18}$

$= \frac{18 - 3\sqrt{30}}{\sqrt{30}\times 3} = 6\sqrt{\frac{}{}} -$

$\therefore \frac{7\sqrt{2}}{3+\sqrt{2}} - \frac{2\sqrt{5}}{\sqrt{6}+\sqrt{5}} - \frac{3\sqrt{2}}{\sqrt{15}+3\sqrt{2}}$

$= 3\sqrt{2} - 2 - 2\sqrt{30} + 10 - 6 + \sqrt{30}$

$= 3\sqrt{2} - \sqrt{30} + 2$

18. (c) Since, the equation intersect X-axis.

$\therefore y = 0$

$\therefore 0 = 4x - 2 \Rightarrow 2 = 4x$

$\therefore x = \frac{1}{2}$

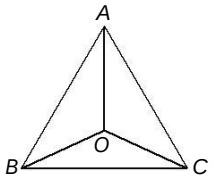
Hence, the required point is $\left(\frac{1}{2}, 0\right)$.

19. (D) In ΔABC,

$AB = AC$

$\therefore \angle B = \angle C$

[since, angle opposite to equal sides are equal]



$\therefore \frac{1}{2}\angle B = \frac{1}{2}\angle C$

$\therefore \angle OBC = \angle OCB$

$\therefore OB = OC$

In ΔABO and ΔACO,

$AB = AC$

$\angle OBC = \angle OCB$

and $OB = OC$

By SAS,

$\Delta ABO \cong \Delta ACO$

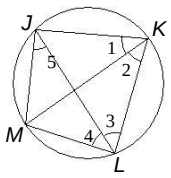
$\therefore \angle BAO = \angle CAO$ [by CPCT]

Hence, AO is the bisector of $\angle BAC$.

20. (A) $BD = AB\sqrt{2} + AD^2$

So, ΔABD is a right angled triangle and ΔBDC is an equilateral triangle.

21. (d) Given,



$\angle 1 = \angle 2$ [since, MK bisects $\angle JKL$] ...(i)

Also, $\angle 1 = \angle 4$ ...(ii)

[angles in same segment are equal]

and $\angle 2 = \angle 5$ [angle in same segments are equal] ...(iii)

From Eqs. (i), (ii) and (iii),

$\angle 4 = \angle 5$

$\therefore JM = ML$

[Qsides opposite to equal angle are equal]

Hence, ΔJML is an isosceles triangle.

22. (d) Let edge of square field be a.

Area covered by Edward $= a + a = 2a$

Area covered by Misha $= \sqrt{a^2 + a^2} = \sqrt{2}a$

$\therefore$ Required percentage $= \frac{2a}{\sqrt{2}a} \times 100$

$= \sqrt{2} \times 100$

$= 141\%$

23. (a) Q Total expenditure = 6240 ´ 3 + 6780 ´ 4 + 7236 ´ 5

= 18720 + 27120 + 36180

= 82020

and savings = ` 7080

Total income = ` (82020 + 7080) = ` 89100

\ Average monthly income = $\frac{89100}{12}$ = ` 7425

24. (b) Given, $\sqrt[5]{\sqrt[4]{(2^4)^3}} - 5\sqrt[5]{8} + 2\sqrt[5]{\sqrt[4]{(2^3)^4}}$

$= \sqrt[5]{(2^4)^{3/4}} - 5\sqrt[5]{8} + 2\sqrt[5]{2^3}$

$= \sqrt[5]{8} - 5\sqrt[5]{8} + 2\sqrt[5]{8}$

$= -2(\sqrt[5]{8})$

25. (b) Q E = Water the plants height more than 15 cm

$\bar{E}$ = Doesn't water the plants having height more than 15 cm

\ $P(E) = 1 - P(E) = 1 - \frac{2}{5} = \frac{3}{5}$

26. (b) $p(x) = (40 - 4x^2)(x) - 15x$

$= 40x - 4x^3 - 15x = -4x^3 + 25x$

27. (a) According to the question,

$2a(1) + (a + 8) \times 2 = 32$

Þ $2a + 2a + 16 = 32$ Þ $4a = 16$

\ $a = 4$

28. (c) Q $CD \parallel EF \parallel l$ [given]

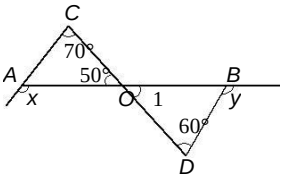
Now, Ð $x = (180° - 130°) + (180° - 132°)$

$= 50° + 48° = 98°$

\ Ð $y = (180° - 130°) + 30°$

$= 50° + 30° = 80°$

29. (b) A.

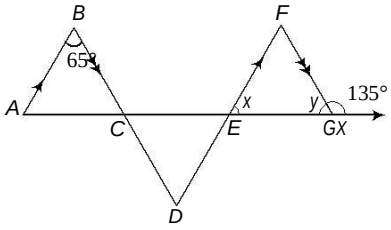


Now, Ð1 = Ð CA = 50° [vectically opposite angle]

\ $y = 50° + 60° = 110°$ Also,

Ð $x = 70° + 50° = 120°$

B.



Ð $y = 180° - 135°$ [linear pair]

$= 45°$

Now, $FG \parallel BC$

\ ÐBCE = FGX = 135° [corresponding angle]

\ Ð BAC = Ð BCE - ÐABC

$= 135° - 65°$

$= 70°$

Now, x = Ð BAC = 70° [corresponding angle]

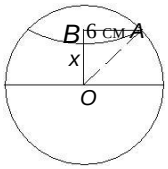
C. Similarly, we solve and get

$x = 23°$

and $y = 67°$

30. (b) We have, $AB = \frac{1}{2}$ diameter of circle = 6 cm

and $OA = \frac{1}{2}$ diameter of sphere = 10 cm



In DOBA,

$OA^2 = OB^2 + AB^2$

Þ $10^2 = OB^2 + 6^2$

Þ OB = 8 cm

\ x = 8 cm

PRACTICE SET 1