X^{th} std Public Examination

May - 2022

MATHEMATICS - ANSWER KEY

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PATTUKKOTTAI.

PART - A [ONE MARKS]

1	d) $(3, -2)$
2	b) 2
3	d) $7nd$ (CREATIVE)
4	b) 5
5	b) $16x^2$
6	b) 1 (CREATIVE)
7	d) $5\sqrt{2}$ cm (CREATIVE)
8	b) 4 cm
9	c) 9
10	b) 1
11	b) 43.92 m
12	a) $4\pi r^2$ sq.units
13	c) 4 (CREATIVE)
14	b) 1

3) $t_n = a + (n-1)d$

$t_{8n} = a + (8n-1)d$

$t_{8n} - t_n = [8n-1-(n-1)]d$

$= [8n-1-n+1]d = 7nd$ (d)

6) $x^2+4x+4=0$

It's Roots are -2 only

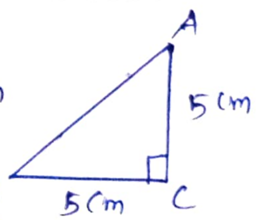
$x^2+4x+4=0$

$(x+2)(x+2)=0$

$x=-2,$

$\boxed{\text{No of Point of intersect} = 1 \text{ (b)}}$

7) Let $AC = BC = 5$ cm

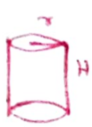


By Pythagoras Theorem

$AB^2 = AC^2 + BC^2 = 25 + 25 = 2 \times 25$

$\boxed{AB = 5\sqrt{2} \text{ cm (d)}}$

13) Volume of the Cylinder $= \pi r^2 H$



$r = 2R$

Volume of the new Cylinder $= \pi(2R)^2 H$

$= 4\pi R^2 h$

The Ratio $= \pi 4 r^2 H : \pi r^2 h = 4 : 1$ (c)

PART - II

15 Given $A = \{1, 2, 3\}$
$B = \{2, 3, 5, 7\}$
$A \times B = \{(1,2), (1,3), (1,5), (1,7), (2,2), (2,3), (2,5), (2,7)$
$(3,2), (3,3), (3,5), (3,7)\}$

$B \times A = \{(2,1), (2,2), (2,3), (3,1), (3,2), (3,3), (5,1) (5,2), (5,3),$
$(7,1), (7,2), (7,3)\}$

16 (i) Set builder form of $R = \{(x,y) \mid y = x-2, x \in P, y \in Q\}$
(ii) Roster form of $R = \{(5,3), (6,4), (7,5)\}$

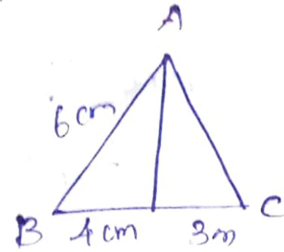
17. Given, $13824 = 2^a \times 3^b$
$2^9 \times 3^3 = 2^a \times 3^b$
$\boxed{a=9}$ $\boxed{b=3}$

18 $AP = 16, 11, 6, 1$
$t_n = -54$
$\boxed{a=16}$ $\boxed{d=-5}$
$t_n = a+(n-1)d$
$-54 = 16+(n-1)-5 \Rightarrow -5n = -75 \Rightarrow n = 75/5 = 15$ $\boxed{n=15}$
15^{th} term is -54

19 $\dfrac{7p+2}{8p^2+13p+5}$ $8p^2+13p+5=0$
$(8p+5)(p+1)=0$
$p = -5/8$, $p = -1$, the excluded values are $-5/8$ and -1

20 In ΔABC, AD is the bisector of $\angle A$.

By Angle bisector Theorem.



$$\frac{BD}{DC} = \frac{AB}{AC}$$

$$4/3 = 6/AC$$

$$\boxed{AC = 4.5\,cm}$$

21. Given the Points are $(-1.5, 3)$, $(6, -2)$ $(-3, 4)$

Area of $\Delta = \frac{1}{2}\{(x_1y_2 + x_2y_3 + x_3y_1) - (x_2y_1 + x_3y_2 + x_1y_3)\}$

$= \frac{1}{2}\{18 - 18\} = 0$.

22. $(3, -2)$, $(12, 4)$ $(6, -2)$ $(12, 2)$

The slope of line p is $m_1 = \frac{4+2}{12-3} = 2/3$

The slope of line q is $m_2 = \frac{2+2}{12-6} = 2/3$

Thus slope of line p = slope of line q.

$\therefore$ The line p is Parallel to the line q.

23. slope $m = -5/4$ Point $(x_1, y_1) = (-1, 2)$

Equation: $y - y_1 = m(x - x_1)$

$y - 2 = -5/4(x - (-1))$

$y - 2 = -5/4(x+1)$

$4(y-2) = -5(x+1)$

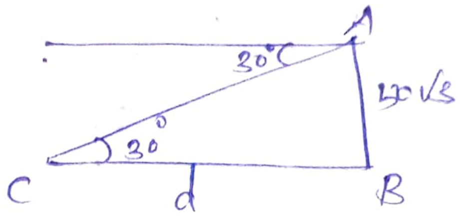
$4y - 8 = -5x - 5$

$5x + 4y - 8 + 5 = 0$

$$\boxed{5x + 4y - 3 = 0}$$

24.

In the figure



$\tan 30° = \frac{AB}{BC}$

$\frac{1}{\sqrt{3}} = \frac{50\sqrt{3}}{d}$

$d = 50 \times 3$

$\boxed{d = 150\,m}$

25 Let r_1, r_2 be the radii of the balloons

$\frac{r_1}{r_2} = \frac{12}{16} = \frac{3}{4}$

ratio of C.S.A of balloons $= \frac{4\pi r_1^2}{4\pi r_2^2} = \left(\frac{3}{4}\right)^2 = \frac{9}{16}$

$\therefore$ Ratio of C.S.A of balloons is 9:16

26

$V_1 = 3600\ cm^3$ $\quad r_1 = r_2$

$V_2 = 5040\ cm^3$

$\frac{\frac{1}{3}\pi r_1^2 h_1}{\frac{1}{3}\pi r_2^2 h_2} = \frac{3600}{5040}$

$\frac{h_1}{h_2} = \frac{90}{126} = \frac{5}{7}$

$\boxed{h_1 : h_2 = 5:7}$

27)

$S = \{HH, HT, TH, TT\}$ $\quad n(S) = 4$

$A = \{HT, TH\}$, $n(A) = 2$

$P(A) = \frac{n(A)}{n(S)} = \frac{2}{4} = \frac{1}{2}$

28. $P = \frac{x}{x+y}$ $\quad Q = \frac{y}{x+y}$

$P^2 = \frac{x^2}{(x+y)^2}$ $\quad Q^2 = \frac{y^2}{(x+y)^2}$

$$\frac{1}{P^2 - Q^2} = \frac{1}{\frac{x^2}{(x+y)^2} - \frac{y^2}{(x+y)^2}} = \frac{(x+y)^2}{x^2-y^2} = \frac{(x+y)^2}{(x+y)(x-y)} = \frac{x+y}{x-y}$$

PART - III

29. $A = \{1, 2, 3, 4, 5, 6, 7\}$

$B = \{2, 3, 5, 7\}$

$C = \{2\}$

$B - C = \{3, 5, 7\}$

LHS:

$A \times (B - C) = \{(1,3), (1,5), (1,7), (2,3), (2,5), (2,7), (3,3), (3,5), (3,7), (4,3), (4,5), (4,7), (5,3), (5,5), (5,7), (6,3), (6,5), (6,7), (7,3), (7,5), (7,7)\}$ —— (1)

RHS:

$(A \times B) - (A \times C) = \{(1,3), (1,5), (1,7), (2,3), (2,5), (2,7), (3,3), (3,5), (3,7), (4,3), (4,5), (4,7), (5,3), (5,5), (5,7), (6,3), (6,5), (6,7), (7,3), (7,5), (7,7)\}$ —— (2)

From (1) & (2) $\Rightarrow$

$A \times (B - C) = (A \times B) - (A \times C)$ Hence Proved

30. Let a be the first term

d be the common difference.

(i) $a + (l-1)d = x$ —— (1)

$a + (m-1)d = y$ —— (2)

$a + (n-1)d = z$ —— (3)

$x(m-n)+y(n-l)+z(l-m)$

$= a[0]+d[lm-ln-m+n+mn-lm-n+l+ln-mn-l+m]$

$= a(0)+d(0)=0.$

(ii) $x-y=(l-m)d$

$y-z=(m-n)d$

$z-x=(n-l)d$

$(x-y)n+(y-z)l+(z-x)m=[ln-mn+lm-nl+nm-lm]d$

$=0.$

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31. $t_6 : t_8 = 7:9$

$a+5d : a+7d = 7:9$

$9(a+5d)=7(a+7d)$

$2a=4d$

$\boxed{a=2d}$

To Find $t_9 : t_{13} \Rightarrow a+8d : a+12d$

$= 2d+8d : 2d+12d$

$= 10d : 14d = 5:7$

$\boxed{t_9 : t_{13} = 5:7}$

32.

	$6x^2-5x+3$
$6x^2$	$36x^4-60x^3+61x^2-mx+n$
	$36x^4$
$12x^2-5x$	$-60x^3+61x^2$
	$-60x^3+25x^2$
$12x^2-10x+3$	$36x^2-mx+n$
	$36x^2-30x+9$
	0

$-m+30=0$ $\quad$ $n-9=0$

$\boxed{m=30}$ $\quad$ $\boxed{n=9}$

33

Given

$$pqx^2 - (p+q)^2 x + (p+q)^2 = 0$$

$a = pq \qquad b = -(p+q)^2 \qquad c = (p+q)^2$

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

$$x = \frac{-[-(p+q)^2] \pm \sqrt{[-(+p+q)]^2 - 4(pq)(p+q)^2}}{2pq}$$

$$= \frac{(p+q)\{(p+q) \pm (p-q)\}}{2pq}$$

$$x = \frac{p+q}{2pq} \times 2p, \ \frac{p+q}{2pq} \times 2q$$

we get $\boxed{x = \frac{p+q}{q}, \ \frac{p+q}{p}}$

34.

$$7x^2 + ax + 2 = 0$$

$\alpha + \beta = -a/7$

$\alpha\beta = 2/7$

Given $\beta - \alpha = -13/7 \Rightarrow \alpha - \beta = 13/7$

squaring on both sides

$$(\alpha - \beta)^2 = (13/7)^2$$

$$\alpha^2 + \beta^2 - 2\alpha\beta = 169/49$$

$$a^2/49 = \frac{225}{49}$$

$a^2 = 225 \Rightarrow a = \pm 15$

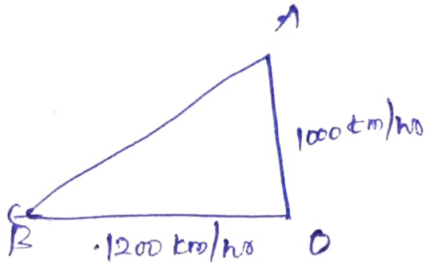
The value of $a = 15$ (or) -15

35. Thales Theorem:

Book Page No: 172
Theorem: 1

36.

Let the first aeroplane starts from O and goes upto A towards north
(Distance = speed × time)



$OA = 1000 \times 3/2$ km $= 1500$ km

$OB = 1200 \times 3/2 = 1800$ km

In right angled triangle AOB,

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

$= (1500)^2 + (1800)^2 = 100^2(15^2 + 18^2)$

$AB = 100 \times 3 \times \sqrt{61}$

$\boxed{AB = 300\sqrt{61} \text{ kms}}$

37. A(−4, −2) B(5, −1) C(6, 5) D(−7, 6)

Midpoint of AB = $E\left(\frac{1}{2}, \frac{-3}{2}\right)$

Midpoint of BC = $F\left(\frac{11}{2}, \frac{4}{2}\right)$

Midpoint of CD = $G\left(\frac{-1}{2}, \frac{11}{2}\right)$

Midpoint of AD = $H\left(\frac{-11}{2}, \frac{4}{2}\right)$

slope of EF $= \dfrac{4/2 - (-3/2)}{11/2 - 1/2} = 7/10$

slope of FG $= \dfrac{11/2 - 2/1}{-1/2 - 11/2} = 7/-12$

slope of GH $= \dfrac{2 - 11/2}{-11/2 - (-1/2)} = 7/10$

slope of HE $= \dfrac{2 - (-3/2)}{-11/2 - 1/2} = 7/-12$

$(0, 8/2) = (0, 4)$

opposite sides are ∥ as their slopes are equal the mid points of the diagonals are the same.

Midpoints of the sides of a quadrilateral form a Parallelogram

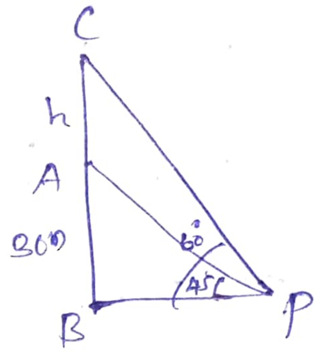
38

Let $AC = h$ m $AB = 30$ m

In Δ ACBP, $\angle CPB = 60^\circ$

$\tan\theta = \frac{BC}{BP}$

$\tan 60^\circ = \sqrt{3} = \frac{30+h}{BP}$ —(1)



In Δ ABP, $\angle APB = 45^\circ$

$\tan\theta = \frac{AB}{BP} = \tan 45^\circ = \frac{30}{BP}$

$BP = 30$ —(2)

sub (2) in (1) we get $\sqrt{3} = \frac{30+h}{30}$

$h = 30(\sqrt{3}-1) = 21.96$

Height of the tower is 21.96 m.

39

Volume of Frustum $= \frac{1}{3}\pi(R^2+Rr+r^2)h$ cubic units

$= \frac{1}{3} \times \frac{22}{7}(20^2+20\times 8+8^2)16$

$= \frac{73216}{7} = 10459.428$ cm^3

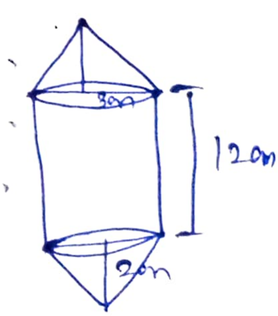
1000 cm$^3 = 1$ litre

The cost of milk ₹. 40 per litre

₹ 418.36

40.

Volume of the model = Volume of the cylinder + Volume of 2 cones



$= \pi r^2 h + 2\frac{1}{3}\pi r^2 h$

$= \frac{22}{7} \times \frac{3}{2} \times \frac{3}{2} \times 8 + 2 \times \frac{1}{3} \times \frac{22}{7} \times \frac{3}{2} \times \frac{3}{2} \times 2$

$= 9.42$ cm^2 Total volume $= 56.57 + 9.42 = 65.99$ cm^3

41.

$n(S) = 50$

$n(A) = 28 \quad n(B) = 30, \quad n(A \cap B) = 18$

$P(A) = \frac{n(A)}{n(S)} = \frac{28}{50}$

$P(B) = \frac{n(B)}{n(S)} = \frac{30}{50}$

$P(A \cap B) = \frac{n(A \cap B)}{n(S)} = \frac{18}{50}$

(i). $P(A \cap \bar{B}) = P(A) - P(A \cap B) = \frac{28}{50} - \frac{18}{50} = 1/5$

(ii) $P(\bar{A} \cap B) = P(B) - P(A \cap B) = \frac{30}{50} - \frac{18}{50} = \frac{6}{25}$

(iii) $P[(A \cap \bar{B}) \cup (\bar{A} \cap B)] = P(A \cap \bar{B}) + P(\bar{A} \cap B)$

$= 1/5 + 6/25 = 11/25$

42. Let

x intercept $= a$

y intercept $= b$

Given $a = b + 5$

eqn: $\frac{x}{a} + \frac{y}{b} = 1$

$\frac{x}{b+5} + \frac{y}{b} = 1$ —— (1)

(1) Passing through $(22, -6)$

$\frac{22}{b+5} + \frac{-6}{b} = 1$

$22b + (b+5)(-6) = b(b+5)$

$22b + (-6b) - 30 = b^2 + 5b$

$22b - 6b - 30 = b^2 + 5b$

$b^2 - 16b + 5b + 30 = 0$

$b^2 - 11b + 30 = 0$

$(b-6)(b-5) = 0$

$b = 6, \ b = 5$

Let $b = 5$

$a = 5 + 5 = 10$

$\boxed{a = 10}$

$\frac{x}{10} + \frac{y}{5} = 1$

$\boxed{5x + 10y - 50 = 0}$

Let $b = 6$,

$a = 6 + 5 = 11$

$\boxed{a = 11}$

$\frac{x}{11} + \frac{y}{6} = 1$

$\boxed{6x + 11y - 66 = 0}$

PART - IV

43]

a) EXERCISE - 4.2 (14) [Book Page No: 182]

[OR]

b) EXERCISE - 4.4 (15) [Book Page No: 194]

44]

a) EXAMPLE - 3.55 [Book Page No: 136]

[OR]

b) EXERCISE - 3.16 - 1 (ii) [Book Page No: 137]

பிழைகள் இருப்பின்

மன்னிக்கவும்....

அன்புடன்

ரா. விஜய

24/05.22

2.45 P.M.