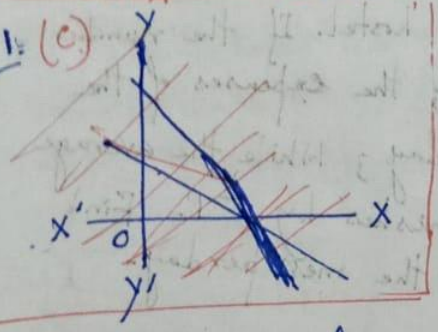
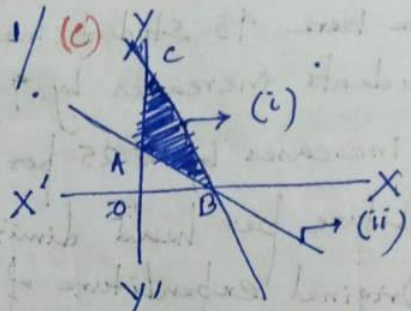
[A] ANSWERS :- (6)

1. (c)



1. (c)



The straight line of the equation $x = 0$ is y axis $\rightarrow$ (i)

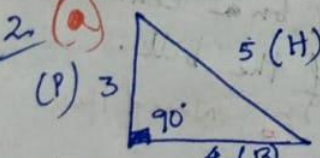
$2x + 3y = 6 \Rightarrow \frac{x}{3} + \frac{y}{2} = 1 \longrightarrow$ (ii)

$x + y = 3 \Rightarrow \frac{x}{3} + \frac{y}{3} = 1 \longrightarrow$ (iii)

$\triangle ABC = \triangle BOC - \triangle AOB = \left(\frac{1}{2} \times 3 \times 3\right) - \left(\frac{1}{2} \times 3 \times 2\right)$

$= \frac{3}{2}(3-2) = \frac{3}{2} = 1\frac{1}{2}$ squares.

2. (a)



[Right-angled triangle]

$\therefore$ Inradious: $r = \frac{P + B - H}{2}$

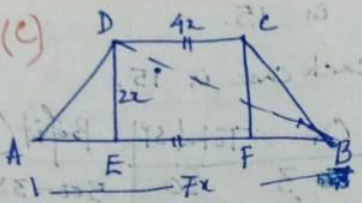
$= \frac{3+4-5}{2}$

$= 1$ cm

Circum radious: $\rightarrow R =$ [redacted] Half of $H = \frac{5}{2}$ cm

$\therefore \frac{r}{R} = \frac{1}{\left(\frac{5}{2}\right)} \Rightarrow r : R = \frac{2}{5} \Rightarrow r^2 : R^2 =$ **4 : 25**

3. (c)



Height = DE = CF = $\left(\frac{2}{11} \times 11x\right)$ = $2x$

Now, AD = BC ; AE = FB.

$(AE + EF + FB) = 7x = \frac{3x}{2} + 4x + \frac{3x}{2}$

$\therefore$ Area $= \frac{1}{2} \times 2x \times (4x + 7x) = 176$

$\Rightarrow 11x^2 = 176 \Rightarrow x = 4$

BD = Diagonal $= \sqrt{(DE)^2 + (BE)^2} = \sqrt{(2x)^2 + \left(4x + \frac{3x}{2}\right)^2}$

$= \sqrt{4x^2 + \frac{121x^2}{4}} = \sqrt{\frac{137x^2}{4}} = \frac{x}{2}\sqrt{137}$

$\therefore$ Required answer is: $\boxed{2\sqrt{137}}$

1. (b) $A = P\left(1 + \frac{r}{100}\right)^n$

$\Rightarrow 2P = P\left(1 + \frac{r}{100}\right)^n$

$\Rightarrow \left(1 + \frac{r}{100}\right)^n = 2 \longrightarrow (i)$

$8P = P\left(1 + \frac{r}{100}\right)^T$ [$\because$ T = time]

$\Rightarrow \left(1 + \frac{r}{100}\right)^T = (2)^3$

$\Rightarrow \left(1 + \frac{r}{100}\right)^T = \left(1 + \frac{r}{100}\right)^{12}$ [from eq(i)]

$T = \boxed{12 \text{ yrs}}$

5. (b) $V = \frac{D}{T} \Rightarrow$ if D = Const, then $V \propto \frac{1}{T}$.

Now, Time Ratio $\rightarrow$ A : B = 120 : 140 [Since 2 hr = 120 mins, 2 h 20 m = 140 min]

$\therefore$ Speed Ratio $\rightarrow$ 140 : 120

7 : 6

According to the question: 13 = 65

1 = 5

6 = $\boxed{30 \text{ km/h}}$

(A) ANSWERS :- (8)

6. (d) L.C.M of 3, 5 and 3 is 15.

Let the number of Oranges in each case is 15.

Or	CP₁ (₹)	Or	CP₂ (₹)	Or	Total SP	Profit (%)
3	40	5	60	3	50	$\frac{500-380}{380}\times 100$
×5 (	)×5	×3 (	)×3	×10 (	)×10	$= \boxed{32\%}$
15	200	15	180	30	500	

7. (b) $x = \sqrt{a} + \frac{1}{\sqrt{a}}$, $y = \sqrt{a} - \frac{1}{\sqrt{a}}$

$$\left(x^4 - x^2y^2 - 1\right) + \left(y^4 - x^2y^2 + 1\right) \quad \therefore$$

$$= x^4 - x^2y^2 - 1 + y^4 - x^2y^2 + 1$$

$$= x^4 - 2x^2y^2 + y^4$$

$$= \left(x^2 - y^2\right)^2 \quad \left[\because 4ab = (a+b)^2 - (a-b)^2\right]$$

$$= \left\{\left(\sqrt{a} + \frac{1}{\sqrt{a}}\right)^2 - \left(\sqrt{a} - \frac{1}{\sqrt{a}}\right)^2\right\}^2 = \left(4 \times \sqrt{a} \times \frac{1}{\sqrt{a}}\right)^2 = \boxed{16}$$

8. (c) Total expression : $2 + 2^2 + 2^3 + \cdots + 2^n$

$$= \frac{2\left(2^n - 1\right)}{(2-1)} \quad \left[\because r > 1 \;;\; \therefore S = \frac{a\left(r^n - 1\right)}{r-1}\right]$$

$$= 2\left(2^n - 1\right)$$

$\therefore$ New average $= a + \frac{2\left(2^n - 1\right)}{n}$

9. (c) $\sqrt{7 + 4\sqrt{3}} = \sqrt{(2)^2 + (\sqrt{3})^2 + 2 \cdot 2 \cdot \sqrt{3}} = \sqrt{(2+\sqrt{3})^2} = (2+\sqrt{3})$

$\sqrt{4 + 2\sqrt{3}} = \sqrt{(\sqrt{3})^2 + (1)^2 + 2\sqrt{3}} = \sqrt{(\sqrt{3}+1)^2} = (\sqrt{3}+1)$

$$\therefore \frac{6^2 + 7^2 + 8^2 + 9^2 + 10^2}{\sqrt{7 + 4\sqrt{3}} - \sqrt{4 + 2\sqrt{3}}} = \frac{\left(1^2 + 2^2 + \cdots + 10^2\right) - \left(1^2 + 2^2 + \cdots + 5^2\right)}{(2+\sqrt{3}) - (\sqrt{3}+1)} \quad \therefore$$

$$= \frac{\frac{10 \times 11 \times 21}{6} - \frac{5 \times 6 \times 11}{6}}{\left(2 + \sqrt{3} - \sqrt{3} - 1\right)} = \frac{11}{6}(210 - 30) = \left(\frac{11}{6} \times 180\right)$$

$$= \boxed{330}$$

10. (c) Length of each side = 1·2m = 12 dcm

Volume of the tank = $(12)^3$ dcm^3 = $(12)^3$ litres

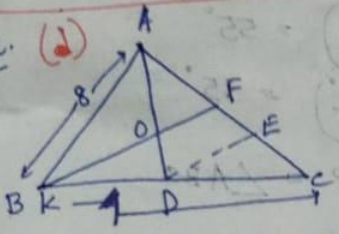
[1 cubic dcm = 1 litres]

∴ 69 buckets of Water = $(12)^3 \times \left(1-\frac{1}{3}\right)$

∴ 1 bucket of Water = $\left(\frac{4^3 \times 3^3}{4^3} \times \frac{2}{3}\right)$ = 18 litres

11. (c) Area increased by is $Z = \left(30+30+\frac{30\times30}{100}\right)\% = 69\%$

12. (d)



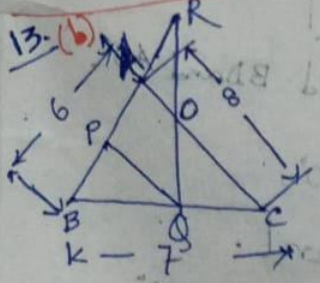
From ▲ADE; OF ∥ DE and 'O' is midpoint of AD;

then; AF = EF ⟶ (i)

Again; From ▲CBF; DE ∥ OF and 'D' is the midpoint of BC. Then; EF = EC ⟶ (ii)

From (i) and (ii); We get → AF = EF = EC = $\frac{1}{3}$AC = $\frac{9}{3}$ = 3cm

13. (b)



▲ABC ~ ▲PBQ [Similar]

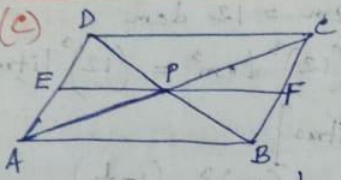
∴ PQ = $\frac{1}{2}$AC = 4cm

▲PQR ~ ▲ARQ [Similar]

∴ AQ = $\frac{1}{2}$PQ = 2cm

(A) → Answers :-

14. (c)



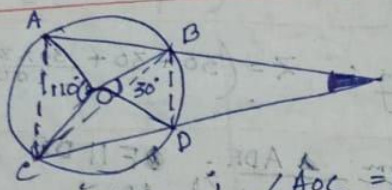
$DC \parallel EF \parallel AB$

$\triangle APB + \triangle DPC = \frac{1}{2}\square ABFE + \frac{1}{2}\square CDEF$

$= \frac{1}{2}\left(\square ABFE + \square CDEF\right)$

$\therefore \triangle APB + \triangle DPC = \frac{1}{2}\square ABCD = \left(\frac{1}{2} \times 40\right) = \boxed{20\ cm^2}$

16. (a)



$\therefore \angle ABC = \frac{1}{2}\angle AOC = \left(\frac{110^\circ}{2}\right) = 55^\circ$

$\angle BCD = \frac{1}{2}\angle BOD = \left(\frac{30^\circ}{2}\right) = 15^\circ$

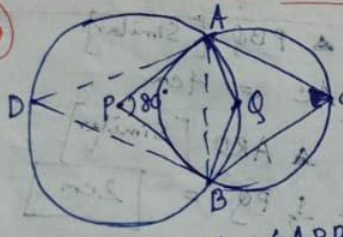
$\therefore$ In $\triangle BPC$; $\angle BPC + \angle BCP = \angle ABC$

$\Rightarrow \angle BPC = \angle ABC - \angle BCP$

$= (55^\circ - 15^\circ)$ [Since; $\angle BCD = \angle BCP$]

$= \boxed{40^\circ}$

15. (b)



Let D is a point on major arc.

join AD and BD and AB.

Now; $\angle ADB = \frac{1}{2}\angle APB = \left(\frac{80}{2}\right)^\circ = 40^\circ$.

Then; AQBD is a cyclic quadrilateral.

$\therefore \angle ADB + \angle AQB = 180^\circ$; then $\angle AQB = 140^\circ$

$\therefore \angle ACB = \frac{1}{2}\angle AQB = \left(\frac{140^\circ}{2}\right) = \boxed{70^\circ}$

[A] :- ANSWERS :-

17. (b) $1+(3+1)(3^2+1)(3^4+1)(3^8+1)(3^{16}+1)(3^{32}+1)$

$= 1+\frac{1}{2}\left[(3-1)(3+1)(3^2+1)(3^4+1)(3^8+1)(3^{16}+1)(3^{32}+1)\right]$

$= 1+\frac{1}{2}\left[(3^2-1)(3^2+1)(3^4+1)(3^8+1)(3^{16}+1)(3^{32}+1)\right]$

$= 1+\frac{1}{2}\left[(3^4-1)(3^4+1)(3^8+1)(3^{16}+1)(3^{32}+1)\right]$

$= 1+\frac{1}{2}\left[(3^8-1)(3^8+1)(3^{16}+1)(3^{32}+1)\right]$

$= 1+\frac{1}{2}\left[(3^{16}-1)(3^{16}+1)(3^{32}+1)\right]$

$= 1+\frac{1}{2}\left[(3^{32}-1)(3^{32}+1)\right]$

$= 1+\frac{1}{2}(3^{64}-1) = \boxed{\frac{3^{64}+1}{2}}$

18. (c) $\left(1-\frac{1}{n+1}\right)\left(1-\frac{2}{n+1}\right)\left(1-\frac{3}{n+1}\right)\cdots\left(1-\frac{n}{n+1}\right)$

Here, $a = \left(1-\frac{1}{n+1}\right)$ and $l = \left(1-\frac{n}{n+1}\right)$

$\therefore S = \frac{n}{2}(a+l)$

$= \frac{n}{2}\left[1-\frac{1}{n+1}+1-\frac{n}{n+1}\right]$

$= \frac{n}{2}\left[\frac{n+1-1+n+1-n}{n+1}\right] = \boxed{\frac{n}{2}}$

19. (b) Ratio of the incomes of present year :- $\rightarrow$ A : B

$\left(3\times\frac{5}{4}\right) : \left(4\times\frac{3}{2}\right)$

$= 5 : 8$

$\therefore$ Present income of A :- $\rightarrow \left(\frac{5}{13}\times 4160\right) = \boxed{₹\,1600}$

20. (b) Applications = 120

(Males) 70 | (Females) 50

Driver's licence = 80

$\therefore$ Males having Driver's licence $\rightarrow$ Minimum : Maximum

$(80-50) : 70$

$30 : 70$

$\boxed{3:7}$

21. (b) Let average expenditure of a student per day = ₹x

∴ Original expenditure of mess per day = ₹45x

Now; no. of students changes to = (45+9) = 54

The average expenditure becomes = ₹(x-1)

∴ Total expenditure = 54(x-1)

∴ According to the question:

$54(x-1) - 45x = 25$

$\Rightarrow 54x - 45x = 79$

$\Rightarrow 9x = 79$

$\Rightarrow x = \frac{79}{9}$

∴ Actual expenditure

$= 45x_5$

$= \left(45 \times \frac{79}{9}\right)$

$= \boxed{₹\,395}$

~~23~~. (a) Single discount equivalent to successive discount of 20% and 20% is :→ $\left(20 + 20 - \frac{20 \times 20}{100}\right) = 36\%$

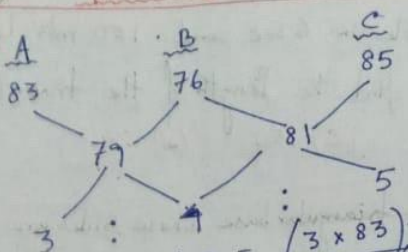
According to the question;

$(36\% - 35\%) = ₹22$

$\Rightarrow \frac{1}{100} = 22$

$\Rightarrow 1 = \boxed{2200}$

22. (d)



Avg of A, B and C $= \frac{(3\times 83)+(4\times 76)+(5\times 85)}{(3+4+5)}$

$= \frac{978}{12} = \boxed{81.5}$

24. (b) $-\left(\frac{1}{3}\times 10\right) + \frac{2}{3}x = (20\times 1)$ [Since, the profit percent of the remainder is x]

$\Rightarrow \frac{2}{3}x = \left(20+\frac{10}{3}\right) = \frac{70}{3}$

$\Rightarrow \boxed{x = 35\%}$

25. (d) Let Actual Weight of the goods be 100 gm.

$\therefore$ Present Weight of the goods $= \left(100-\frac{25}{2}\right)$ gm $= \frac{175}{2}$ gm

Now, the profit is $= \frac{25}{2}$ gm

$\therefore$ Profit (%) $= \left(\frac{25}{2}\times\frac{2}{175}\times 100\right) = \frac{100}{7}\%$

$Z = -x+y-\frac{xy}{100}$

$= -\frac{25}{4}+\frac{100}{7}-\left(\frac{25}{4}\times\frac{100}{7}\times\frac{1}{100}\right)$

$= -\frac{25}{4}\left(1+\frac{1}{7}\right)+\frac{100}{7}$

$= \left(-\frac{25}{4}\times\frac{8}{7}\right)+\frac{100}{7}$

$= \frac{50}{7} = \boxed{7\frac{1}{7}\%\ (\text{Profit})}$

X