माध्यमिक शिक्षा मण्डल, मध्यप्रदेश, भोपाल

24 पृष्ठीय

वर्ष 2014

परीक्षार्थी द्वारा भरा जावे ↓

परीक्षा का विषय	विषय कोड	परीक्षा का माध्यम
Maths	1 0	English

स्टीकर तीर के विपरीत ↓ से निकाल कर लगावें

उत्तर पुस्तिका का सरल क्रमांक: C- 1304293

अंकों में परीक्षार्थी का रोल नम्बर

1	4	6	7	2	7	0	5	8

शब्दों में

One	Four	Six	Seven	Two	Seven	Zero	five	Eight

नीचे दिये गये उदाहरण अनुसार रोल नम्बर भरें।

उदाहरणार्थ	1	1	2	4	3	9	5	6	8
	एक	एक	दो	चार	तीन	नौ	पांच	छः	आठ

परीक्षार्थी द्वारा भरा जावे

क – पूरक उत्तर पुस्तिकाओं की संख्या अंकों में 1 शब्दों में One

ख – परीक्षार्थी का कक्ष क्रमांक 3

ग – परीक्षा का दिनांक 07 03 14

परीक्षा का नाम एवं परीक्षा केन्द्र क्रमांक की मुद्रा

हाई स्कूल सार्टिफिकेट परी.

केन्द्राध्यक्ष
केन्द्र क्र. 672019

केन्द्राध्यक्ष / सहायक केन्द्राध्यक्ष एवं परीक्षक द्वारा भरा जावे

पर्यवेक्षक का नाम एवं हस्ताक्षर	केन्द्राध्यक्ष / सहायक केन्द्राध्यक्ष के हस्ताक्षर
Rashi Shaiv	

परीक्षक एवं उपमुख्य परीक्षक द्वारा भरा जावे

प्रमाणित किया जाता है कि मूल्यांकन के समय पूरक उत्तर पुस्तिकाओं की संख्या उपरोक्तानुसार सही पाई गई होलो ग्राफ्ट स्टीकर क्षतिग्रस्त नहीं पाया गया तथा अन्दर के पृष्ठों के अनुरूप मुख्य पृष्ठ पर अंकों की प्रविष्टी एवं अंकों का योग सही है।

निर्धारित मुद्रा नाम, पदनाम, मोबाईल नम्बर, परीक्षक क्रमांक एवं पदांकित संस्था के नाम की मुद्रा लगावें।

उप मुख्य परीक्षक के हस्ताक्षर एवं निर्धारित मुद्रा	परीक्षक के हस्ताक्षर एवं निर्धारित मुद्रा
नाम- एस के. सोनगरा पदनाम- व्याख्याता मो. ई न- 09926470109 परीक्षक क्रमांक- L/150/020 पदांकित संस्था- उ.मा.वि. अमझेरा	शिवदेव वर्मा (विज्ञान-शिक्षक) Mob. 9617314754 DHTD/100/132 उ.मा. वि. धामनोद (धार)

केवल परीक्षक द्वारा भरा जावे।

प्रश्न क्रमांक के सम्मुख प्राप्तांकों की प्रविष्टी करें।

प्रश्न क्रमांक	पृष्ठ क्रमांक	प्राप्तांक (अंकों में)
1		
2		
3		
4		
5		
6		
7		
8		
9		
10		
11		
12		1
13		
14		
15		
16		
17		4
18		
19		
20		
21		
22		
23		Six
24		
25		
कुल प्राप्तांक श.		100

100

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Question 1

1) $10y + x$
2) 4ℓ
3) 2
4) $45°$
5) $\frac{1}{3}\pi r^2 h$

Question 2

1) $-x - 1$
2) $\log_e m - \log_e n$
3) Equilateral
4) Diameter
5) $\sqrt{3}(2a)$

Question 3

1) True
2) False
3) True
4) True
5) False

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Question 4

1) $\operatorname{cosec}(90° - \theta)$ — $\sec\theta$

2) $\sqrt{1 - \cos^2\theta}$ — $\sin\theta$

3) $\operatorname{cosec}^2\theta - 1$ — $\cot^2\theta$

4) $\dfrac{1}{\cot\theta}$ — $\tan\theta$

5) $\dfrac{\cos\theta}{\sin\theta}$ — $\cot\theta$

Question 5

1) $x + 2$

2) -2

3) Hero's Formula : $\sqrt{s(s-a)(s-b)(s-c)}$

4) $x = 70°$

5) 6

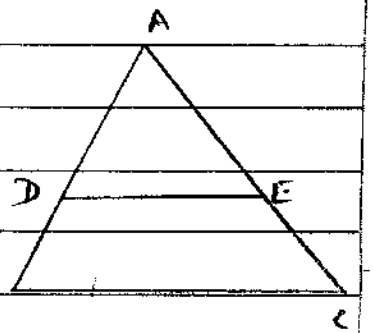
Question 6 "or"

Sol^n The conditions for the similarity of the triangles are as follows :-

Sol^n Thales' Theorem -

"If a line is drawn parallel to one side of a triangle, then it divides the opposite other two sides in same ratio."

Eg - In $\triangle ABC$, $DE \parallel BC \Rightarrow \dfrac{AD}{DB} = \dfrac{AE}{EC}$.



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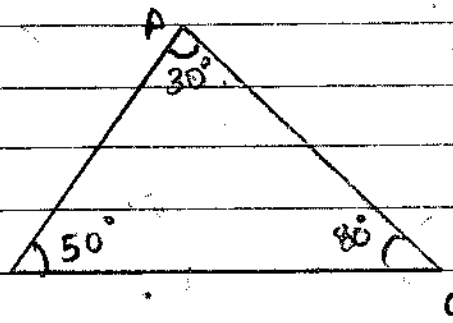
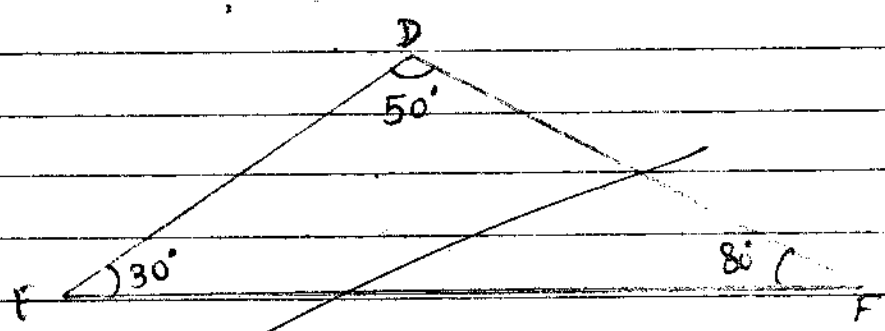
Question 7

(i)



(ii)



Sol) $\triangle ABC$ and $\triangle DEF$

$\angle A = 30°$ $\angle B = 50°$ $\angle C = 80°$

$\angle D = 50°$ $\angle E = 30°$ $\angle F = 80°$

$\triangle ABC$ is not similar to $\triangle DEF$ because their corresponding angles are not ~~similar~~ equal

i.e.,

$\angle A \neq \angle D$

$\angle B \neq \angle E$

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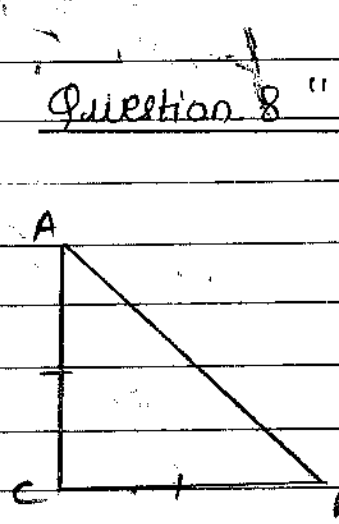
Question 8 "or"

Sol^n:-



Given :- ACB is a triangle, $AC = BC$, $AB^2 = 2AC^2$

To Prove :- $\angle ACB = 90°$ or $\triangle ACB$ is a right triangle

Proof :- It is given that,

$AB^2 = 2AC^2$

$\Rightarrow AB^2 = AC^2 + AC^2$

$\Rightarrow AB^2 = AC^2 + BC^2$ $\{\because AC = BC\}$

∴ The above condition is only created in Pythagorus Theorem and it is applied only in a right triangle.

∴ $\triangle ACB$ is a right angled triangle.

Hence Proved.

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Question 9

Sol^n:- Speed of 10 motor cyclists :

47, 53, 49, 60, 39, 42, 53, 52, 53, 55

Mean $\bar{x}$ = $\frac{\text{Sum of all observations}}{\text{No. of observations}}$

$\Rightarrow \bar{x} = \frac{47+53+49+60+39+42+53+52+53+55}{10}$

$\bar{x} = \frac{503}{10}$

$\Rightarrow \bar{x} = 50.3$ km/h

Hence, the mean speed is 50.3 km/h.

Question 10 "or"

Sol^n:- In a single throw of die,

No. of possible outcomes (sample space) = 6{1,2,3,4,5,6}

No. of favourable outcomes (9) = 0

$\therefore$ Probability (getting 9) = $\frac{\text{No. of favourable outcomes}}{\text{Sample space}}$

$= \frac{0}{6}$

$\Rightarrow$

Hence, probability of getting 9 is 0.

Question 11 "or"

Soln:- Let the present age of Ajita be 'x' years.

Five years ago:
Age of Ajita = $(x-5)$ years
Age of Ankita = $3(x-5)$ years

After 10 years
Age of Ajita = $(x+10)$ years
Age of Ankita = $2(x+10)$ years

Ankita's age after 10 years = Ankita's age before 5 years + 15

$\Rightarrow \quad 2(x+10) = 3(x-5) + 15$

$\Rightarrow \quad 2x + 20 = 3x - 15 + 15$

Question 11 "or"

Soln:- Let the present age of Ajita be 'x' years and of Ankita be 'y' years.

Five years ago:
Age of Ajita = $(x-5)$ years
Age of Ankita = $(y-5)$ years

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According to the first condition,

$$(y-5) = 3(x-5)$$
$$\Rightarrow y-5 = 3x-15$$
$$\Rightarrow -5+15 = 3x-y$$
$$\Rightarrow 10 = 3x-y$$
$$\Rightarrow 3x-y = 10 \quad - (1)$$

After 10 years;
Age of Ajita = $(x+10)$ years
Age of Ankita = $(y+10)$ years

According to the second condition,

$$(y+10) = 2(x+10)$$
$$\Rightarrow y+10 = 2x+20$$
$$\Rightarrow 10-20 = 2x-y$$
$$\Rightarrow -10 = 2x-y$$
$$\Rightarrow 2x-y = -10 \quad - (2)$$

Subtracting eq^n (2) from eq^n (1)

$$\Rightarrow 3x-y = 10$$
$$2x-y = -10$$
$$(-) \quad (+) \quad (+)$$
$$x = 20$$

Putting the value of x in eq" ①

$\Rightarrow 3(20) - y = 10$

$\Rightarrow 60 - y = 10$

$\Rightarrow -y = 10 - 60$

$\Rightarrow -y = -50$

$\Rightarrow y = 50$

Hence, Present Age of Ajita = x = 20 years

Present age of Ankita = y = 50 years

Question 12

Sol. $3x - 4y - 11 = 0$

$3x - 4y = 11$ — ①

$5x - 7y + 4 = 0$

$5x - 7y = -4$ — ②

Elimination by equating the coefficients method

Multiplying eq" ① by 5 and eq" ② by 3

$\Rightarrow 15x - 20y = 55$

$15x - 21y = -12$

(−) (+) (+)

$y = 67$ (On subtracting)

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Putting the value of y in eq" (1)

$\Rightarrow 3x - 4(67) = 11$

$\Rightarrow 3x - 268 = 11$

$\Rightarrow 3x = 11 + 268$

$\Rightarrow 3x = 279$

$\Rightarrow x = \frac{279}{3}$

$\Rightarrow x = 93$

Hence, value of x is 93 and value of y is 67.

Question 13 "or"

Sol"- The given ratio of coins is 3 : 2 : 5

Total coins = 3,150

Let the no. of 1 rupee coins be 3x, 2 rupee coins be 2x and 5 rupee coins be 5x.

$\therefore 3x + 2x + 5x = 3150$

$\Rightarrow 10x = 3150$

$\Rightarrow x = \frac{3150}{10}$

$\Rightarrow x = 315$

(11) [ ] + √[ ] = [ ]

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Hence, no. of 1 rupee coins = 3(315) = 945

no. of 2 rupee coins = 2(315) = 630

no. of 5 rupee coins = 5(315) = 1575.

Question 14 "or"

Sol^n:- $\alpha = \frac{7+\sqrt{5}}{7}$

$\beta = \frac{7-\sqrt{5}}{7}$

The quadratic equation will be:

$x^2 - (\alpha+\beta)x + \alpha\cdot\beta = 0$

$\Rightarrow x^2 - \left(\frac{7+\sqrt{5}}{7} + \frac{7-\sqrt{5}}{7}\right)x + \frac{7+\sqrt{5}}{7} \times \frac{7-\sqrt{5}}{7} = 0$

$\Rightarrow x^2 - \left(\frac{7+\sqrt{5}+7-\sqrt{5}}{7}\right)x + \frac{(7+\sqrt{5})(7-\sqrt{5})}{49} = 0$

$\Rightarrow x^2 - \left(\frac{14}{7}\right)x + \frac{7^2-(\sqrt{5})^2}{49} = 0 \quad \{\because (a+b)(a-b) = a^2-b^2\}$

$\Rightarrow x^2 - 2x + \frac{49-5}{49} = 0$

$\Rightarrow 49x^2 - 98x + 44 = 0$

49

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$\Rightarrow 49x^2 - 98x + 44 = 0 \times 49$

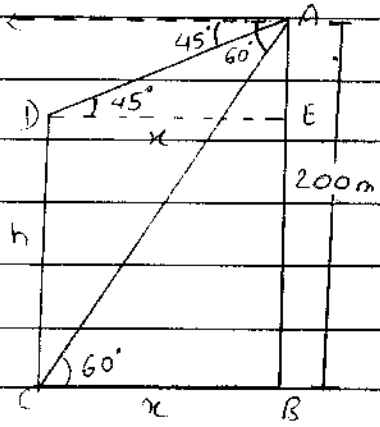
$\Rightarrow 49x^2 - 98x + 44 = 0$

Hence the required quadratic equation is $49x^2 - 98x + 44 = 0$.

Question 15 "or"

Sol^n:- Given :- AB is a 200 m high cliff DC is a tower, Angle of depression from A of D is 45° and of C is 60°

To Find :- Height of tower DC = ?



Sol^n:- Let the height of tower be 'h' metres and distance between tower and cliff be 'x' metres.

In ΔABC,

$\frac{AB}{BC} = \tan 60°$

$\Rightarrow \frac{200}{x} = \sqrt{3}$ $\{\because \tan 60° = \sqrt{3}\}$

$\Rightarrow x = \frac{200}{\sqrt{3}}$ — (1)

In $\triangle AED$,

$$\frac{AE}{ED} = \tan 45^\circ$$

$$\Rightarrow \frac{AB - h}{x} = 1 \quad \{\because \tan 45^\circ = 1\}$$

$BE = DC = h$

$$\Rightarrow 200 - h = x$$

$$\Rightarrow 200 - h = \frac{200}{\sqrt{3}} \quad \{\text{from eq}^n (1)\}$$

$$\Rightarrow \frac{200 - h}{\sqrt{3}} \times \sqrt{3} = \frac{200}{\sqrt{3}} \times \sqrt{3}$$

$$\Rightarrow 200 - h = \frac{200\sqrt{3}}{3}$$

$$\Rightarrow (200 - h)3 = 200 \times 1.732 \quad \{\because \sqrt{3} = 1.732\}$$

$$\Rightarrow 600 - 3h = 346.4$$

$$\Rightarrow -3h = 346.4 - 600$$

$$\Rightarrow -3h = -253.6$$

$$\Rightarrow h = \frac{-253.6}{-3}$$

$$\Rightarrow h = 84.53 \text{ m}$$

Hence, the height of the tower is 84.53 m.

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Question 16

Sol^{n}:- Diameter of I sphere = 2 cm
Radius of I sphere (r_1) = 1 cm

Diameter of II sphere = 12 cm
Radius of II sphere (r_2) = 6 cm

Diameter of III sphere = 16 cm
Radius of III sphere (r_3) = 8 cm
Let the radius of new sphere be 'r'
∴ Volume of new sphere = Volume of sphere I + Volume of sphere II + Volume of sphere III

$$\Rightarrow \frac{4\pi r^3}{3} = \frac{4\pi r_1^3}{3} + \frac{4\pi r_2^3}{3} + \frac{4\pi r_3^3}{3}$$

$$\Rightarrow \frac{4\pi r^3}{3} = \frac{4\pi}{3}(1^3 + 6^3 + 8^3)$$

$$\Rightarrow r^3 = 1 + 216 + 512$$

$$\Rightarrow r^3 = 729$$

$$\Rightarrow r^3 = 9^3$$

$$\Rightarrow r = 9 \text{ cm}$$

Hence, the radius or semi-diameter of the new sphere is 9 cm.

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Question 17 "or"

Sol^n. Ratio of radii of cylinders = 2 : 3
Ratio of heights of cylinders = 5 : 3

Let their radii be $2x$ and $3x$, and let their heights be $5x$ and $3x$ respectively.

Ratio of lateral surfaces $= \frac{2\pi rh}{2\pi rh}$

$\Rightarrow = \frac{2\pi \times 2x \times 5x}{2\pi \times 3x \times 3x}$

$\Rightarrow = \frac{10x^2}{9x^2}$

$\Rightarrow = \frac{10}{9}$

Ratio of volumes $= \frac{\pi r^2 h}{\pi r^2 h}$

$= \frac{\pi \times (2x)^2 \times 5x}{\pi \times (3x)^2 \times 3x}$

$\Rightarrow = \frac{4x^2 \times 5x}{9x^2 \times 3x}$

$\Rightarrow = \frac{20}{27}$

Hence, the ratios of lateral surfaces and volumes of the cylinders are 10 : 9 and 20 : 27 respectively.

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Question 18

Sol:- $x(y^2-z^2)+y(z^2-x^2)+z(x^2-y^2)$

$= xy^2 - xz^2 + yz^2 - x^2y + x^2z - y^2z$

$= -x^2y + x^2z + xy^2 - xz^2 - y^2z + yz^2$

{Arranging in descending order of power of x}

$= -x^2(y-z) + x(y^2-z^2) - yz(y-z)$

$= -x^2(y-z) + x(y-z)(y+z) - yz(y-z)$

$\{\because (a+b)(a-b) = a^2-b^2\}$

$= (y-z)[-x^2 + x(y+z) - yz]$

$= (y-z)(-x^2 + xy + xz - yz)$

$= (y-z)(-yz + xy + xz - x^2)$

{Arranging in descending order of power of y}

$= (y-z)[-y(z-x) + x(z-x)]$

$= (y-z)(z-x)(-y+x)$

∴ Putting in cyclic order

$\Rightarrow (x-y)(y-z)(z-x)$

These are the desired factors.

Question 19 "or"

Sol:- Let the usual speed of the train be 'x' km/h

Distance travelled = 300 km

$\therefore$ Time taken = $\frac{300}{x}$ hr $\quad \{\because T = \frac{D}{S}\}$

When speed is decreased by 5 km/hr

i.e. speed is $(x-5)$ km/hr

Then,

Time taken to travel 300 km = $\frac{300}{x-5}$ hr

According to the given condition,

Time taken in decreased speed =

Time taken with usual speed + 2

$$\Rightarrow \frac{300}{x-5} = \frac{300}{x} + 2$$

$$\Rightarrow \frac{300}{x-5} = \frac{300+2x}{x}$$

$$\Rightarrow (300)x = (300+2x)(x-5)$$

$$\Rightarrow 300x = 300x + 2x^2 - 1500 - 10x$$

$$\Rightarrow 0 = 2x^2 - 1500 - 10x$$

Dividing by 2 on both sides

$$\Rightarrow 0 = x^2 - 750 - 5x$$

$$\Rightarrow x^2 - 5x - 750 = 0$$

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$\Rightarrow x^2 - 30x + 25x - 750 = 0$

$\Rightarrow x(x-30) + 25(x-30) = 0$

$\Rightarrow (x-30)(x+25) = 0$

when $(x-30) = 0$

$\Rightarrow x = 30$

when $(x+25) = 0$

$\Rightarrow x = -25$

Speed can't be negative

$x = 30$

Hence, the usual speed of the train is 30 km/hr.

Question No. 20

Sol^n Principle(P) = Rs 1,200

Rate of Interest(r) = 5% p.a

Time(n) = 4 years

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

$$\Rightarrow = 1200\left(1 + \frac{5}{100}\right)^4$$

$$\Rightarrow = 1200\left(1 + \frac{1}{20}\right)^4$$

(19) ⌜ ⌝ + ⌜ ⌝ = ⌜ ⌝

$$\Rightarrow = 1200 \times \left(\frac{21}{20}\right)^4$$

$$\Rightarrow = \frac{\cancel{1200}^{3} \times 21}{\cancel{20}} \times \frac{21}{\cancel{20}} \times \frac{21}{20} \times \frac{21}{20}$$

$$\Rightarrow = \frac{3 \times 9261 \times 21}{400}$$

$$\Rightarrow = \frac{9261 \times 63}{400}$$

$$= 1458.60$$

Amount = Rs. 1458.60

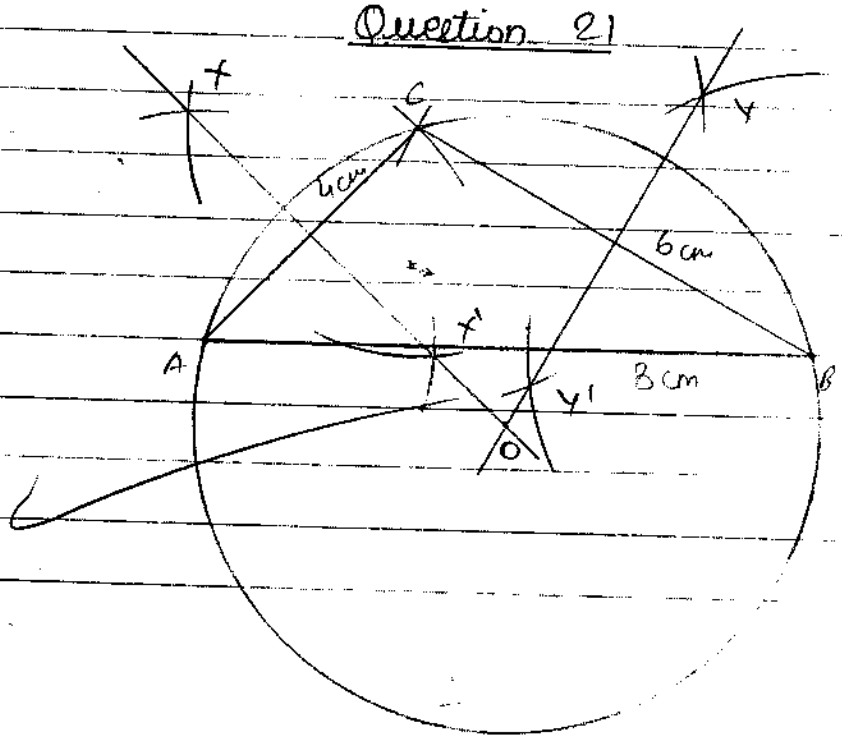
Compound Interest = A − P

$$= 1458.60 - 1200$$

$$= \text{Rs. } 258.60$$

Hence, the amount is Rs. 1458.60 and compound interest is Rs. 258.60.

Question 21



Steps of Construction :-

1) Draw a line segment AB of 8 cm.
2) Taking A and B as centres and 4 cm and 6 cm radii respectively, draw two arcs intersecting at C.
3) Join AC and BC.
4) Construct perpendicular bisectors of AC and BC, intersecting at O.
5) Taking OC as radius and O as centre, draw a circle.
6) The required circumcircle is ready.

Question 22

Sol:- To Prove :- $\frac{\text{Cosec } A}{\text{Cosec } A - 1} + \frac{\text{cosec } A}{\text{Cosec } A + 1} = 2 \sec^2 A$

Proof :- L.H.S. $= \frac{\text{cosec } A}{\text{Cosec } A - 1} + \frac{\text{cosec } A}{\text{cosec } A + 1}$

$\Rightarrow$ $= \text{Cosec } A \left(\frac{1}{\text{Cosec } A - 1} + \frac{1}{\text{Cosec } A + 1} \right)$

$\Rightarrow$ $= \text{cosec } A \left[\frac{\text{Cosec } A + 1 + \text{Cosec } A - 1}{(\text{Cosec } A - 1)(\text{Cosec } A + 1)} \right]$

$\Rightarrow = \text{cosec}\,A\left(\frac{2\,\text{cosec}\,A}{\text{cosec}^2A - 1}\right)$ $\{\because (a+b)(a-b) = a^2-b^2\}$

$\Rightarrow = \frac{2\,\text{cosec}^2A}{\cot^2A}$ $\{\because 1+\cot^2\theta = \text{cosec}^2\theta\}$

$\Rightarrow = \frac{2\,\text{cosec}^2A}{\frac{\cos^2A}{\sin^2A}}$

$= \frac{2}{\sin^2A} \times \frac{\sin^2A}{\cos^2A}$

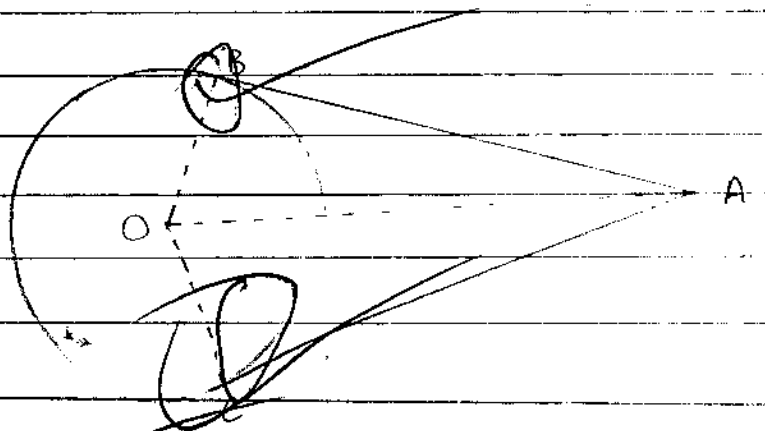
$= \frac{2}{\cos^2A}$

$\Rightarrow = 2\sec^2A$

$= R.H.S.$

Hence Proved.

Question 23



Given:- A circle is given with centre O, AB and AC are two tangents

To Prove:- $AB = AC$

Construction :- Join OB, OC and OA

Proof :- We know that,
Tangent and radius form right angle at contact point.

$\therefore$ OB and OC are radii

$\therefore$ $\angle OBA = 90^\circ$ {AB and AC are tangents}

$\angle OCA = 90^\circ$

In $\triangle OBA$ and $\triangle OCA$,

$\angle OBA = \angle OCA = 90^\circ$

$OA = OA$ {Common Side}

$OB = OC$ {Radii of same circle}

$\therefore$ By R.H.S. congruence rule

$\triangle OBA \cong \triangle OCA$

$AB = AC$ (By C.P.C.T)

Hence Proved.

Question 24

Class Interval	Frequency (f)	Mid-point (x)	fx
0-20	7	10	70
20-40	f_1	30	$30f_1$
40-60	12	50	600
60-80	f_2	70	$70f_2$
80-100	8	90	720
100-120	5	110	550
Total	50		$1940 + 30f_1 + 70f_2$

Mean = 57.6

Sum of frequencies $= 7 + f_1 + 12 + f_2 + 8 + 5$

$\Rightarrow 50 = 32 + f_1 + f_2$

$\Rightarrow f_1 + f_2 = 50 - 32$

$\Rightarrow f_1 + f_2 = 18$ — (1)

Mean $\bar{x} = \frac{\sum fx}{\sum f}$

$\Rightarrow 57.6 = \frac{1940 + 30f_1 + 70f_2}{50}$

$\Rightarrow 57.6 \times 50 = 1940 + 30f_1 + 70f_2$

$\Rightarrow 2880 = 1940 + 30f_1 + 70f_2$

$\Rightarrow 2880 - 1940 = 30f_1 + 70f_2$

$\Rightarrow 30f_1 + 70f_2 = 940$ — (2)

From eqn ① , we

$f_1 = 18 - f_2$ — ③

Putting the value of f_1 in eqn ②

$\Rightarrow 30(18 - f_2) + 70 f_2 = 940$

$\Rightarrow 540 - 30f_2 + 70f_2 = 940$

$\Rightarrow 40f_2 = 940 - 540$

$\Rightarrow 40f_2 = 400$

$\Rightarrow f_2 = \frac{400}{40}$

$\Rightarrow f_2 = 10$

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Putting the value of f_2 in eq^n (3)

$\Rightarrow$ $f_1 = 18 - 10$ [illegible]

$\Rightarrow$ $f_1 = 8$

Hence, the missing frequency f_1 is 8 and f_2 is 10.