A.P. SET CODE
C

MT - y

2017 ___ __ 1100 - MT - y - MATHEMATICS (71) GEOMETRY- SET - C (E)

Time : 2 Hours **Preliminary Model Answer Paper** **Max. Marks : 40**

A.1. Solve ANY FIVE of the following :

(i)

$(10)^2 = 100$ ......(i)

$(6)^2 + (8)^2 = 36 + 64$

$= 100$ ......(ii)

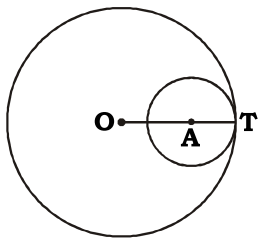
y $(10)^2 = (6)^2 + (8)^2$ [From (i) and (ii)] ½

y The given sides form a right angled triangle. [By Converse of Pythagoras theorem] ½

(ii)

Let $r_1 = 5$ cm and $r_2 = 3$ cm

The circles are touching internally. ½



y Distance between their centres

$= r_1 - r_2$

$= 5 - 3$

$= \boxed{2 \text{ cm}}$ ½

(iii)

Given : ¯ = – 60°

sin (– ¯) = – sin ¯ ½

y sin (– 60°) = – sin 60°

y $\boxed{\sin(-60^\circ) = -\frac{\sqrt{3}}{2}}$ ½

(iv)

$2x - 3y = 4$

y $3y = 2x - 4$

Dividing throughout by 3,

$y = \frac{2}{3}x - \frac{4}{3}$ ½

Comparing the above equation with slope intercept form

$y = mx + c$, we get

$\boxed{\text{y intercept} = \frac{-4}{3}}$ ½

(v) $F + V = E + 2$ [Euler's formula] ½

y $12 + V = 30 + 2$

y $V = 32 - 12$

y $\boxed{V = 20}$ ½

(vi) Side of a square = 8 cm

y Diagonal of the square = $\sqrt{2} \times \text{side}$ ½

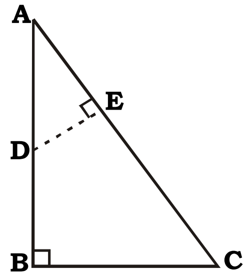
$= \sqrt{2} \times 8$

$= 8\sqrt{2}$ cm

y $\boxed{\text{Diagonal of the square is } 8\sqrt{2} \text{ cm.}}$ ½

A.2. Solve ANY FOUR of the following :

(i) In aABC and aAED,



ĎBAC] ĎDAE [Common angle]

ĎABC] ĎAED [∵ Each is 90°]

y aABC ~ aAED [By AA test of similarity] 1

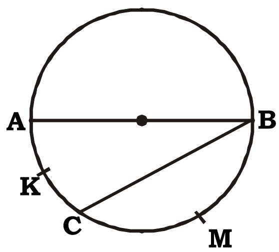
y $\frac{AB}{AE} = \frac{AC}{AD}$ [c.s.s.t.]

y $\frac{12}{AE} = \frac{18}{6}$ [Given] ½

y $AE = \frac{12 \times 6}{18}$

y $\boxed{AE = 4 \text{ units}}$ ½

(ii)



Seg AB is a diameter

y m (arc ACB) = 180° ½

m (arc AKC) + m (arc BMC) = m (arc ACB)

[Arc Addition property] 1

y 40 + m (arc BMC) = 180°

y m (arc BMC) = 180 – 40

y $\boxed{\text{m (arc BMC)} = 140°}$ ½

(iii)

Length of arc (l) = 4® cm

y measure of arc (¯) = 40°

$l = \frac{–}{360} \times 2®r$ ½

y $4® = \frac{40}{360} \times 2 \times ® \times r$

y $\frac{4 \times 9}{2} = r$

y r = 18 cm ½

Area of the sector $= \frac{l \times r}{2}$ ½

$= \frac{4® \times 18}{2}$

$= 36®cm^2$

y **[Radius of the circle is 18 cm and Area of the sector is 36® cm².]** ½

(iv)

The terminal arm passes through P (1, – 1)

y x = 1 and y = – 1

$r = \sqrt{x^2 + y^2}$

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

$= \sqrt{1 + 1}$

$= \sqrt{2}$

y $r = \sqrt{2}$ units

Let the angle be –

y **[$\sin – = \frac{y}{r} = \frac{-1}{\sqrt{2}}$]** 1

(v)

Volume of a cube = 1000 cm³ ½

Volume of a cube = l^3

y l^3 = 1000

y l = 10 cm [Taking cube roots] ½

Total surface area of a cube = $6l^2$ ½

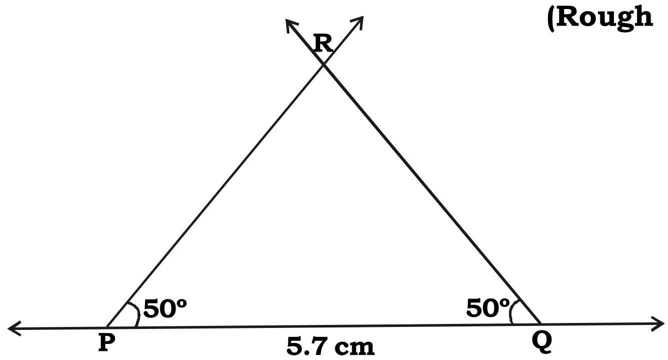
$= 6 \times 10^2$

$= 6 \times 10 \times 10$

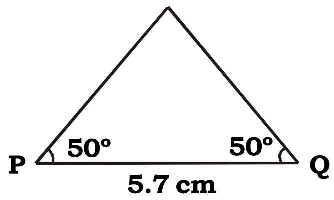
$= 600$ cm²

y **[Total surface area of a cube is 600 cm².]** ½

(vi)



(Rough Figure)



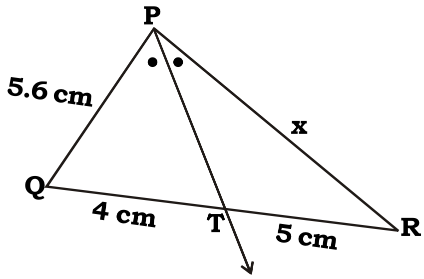
1 mark for drawing seg PQ
1 mark for drawing ĎP and ĎQ

A.3. Solve ANY THREE of the following :

(i) In aPQR,
ray PT bisects ĎQPR [Given]

y $\frac{PQ}{PR} = \frac{QT}{TR}$ [Property of angle bisector of a triangle] ½

y $\frac{5.6}{x} = \frac{4}{5}$



y $x = \frac{5 \times 5.6}{4}$ ½

y $x = 7$

y PR = 7 cm

QR = QT + TR [∵ Q - T - R] ½

y QR = 4 + 5

y QR = 9 cm ½

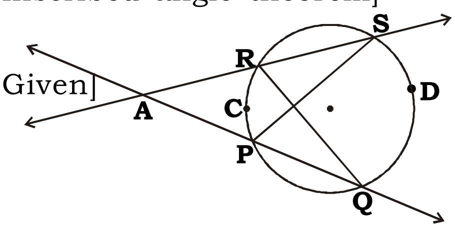
Perimeter of aPQR = PQ + QR + PR ½
= 5.6 + 9 + 7

y **Perimeter of aPQR = 21.6 cm** ½

(ii) (a) m (arc PR) = 26° [Given]

m ĎAQR = $\frac{1}{2}$ m (arc PCR) [Inscribed angle theorem] ½

y m ĎAQR = $\frac{1}{2} \times 26°$ [Given]



y **m ĎAQR = 13°** ½

(b) m (arc QS) = 48° [Given]

m ĎSPQ = $\frac{1}{2}$ m (arc QDS) [Inscribed angle theorem]

y m ĎSPQ = $\frac{1}{2}$ × 48° [Given]

y m ĎSPQ = 24° ½

(c) m ĎSRQ = $\frac{1}{2}$ m (arc QDS) [Inscribed angle theorem]

y m ĎSRQ = $\frac{1}{2}$ × 48° [Given]

y m ĎSRQ = 24° ½

ĎSRQ is an exterior angle of aARQ,

y m ĎSRQ = m ĎRAQ + m ĎAQR

[Remote interior angle theorem] ½

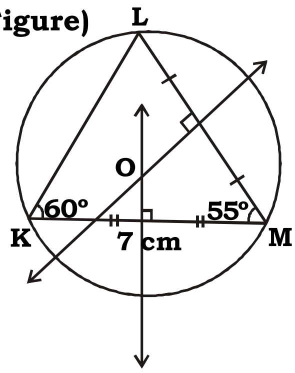
y 24° = m ĎRAQ + 13°

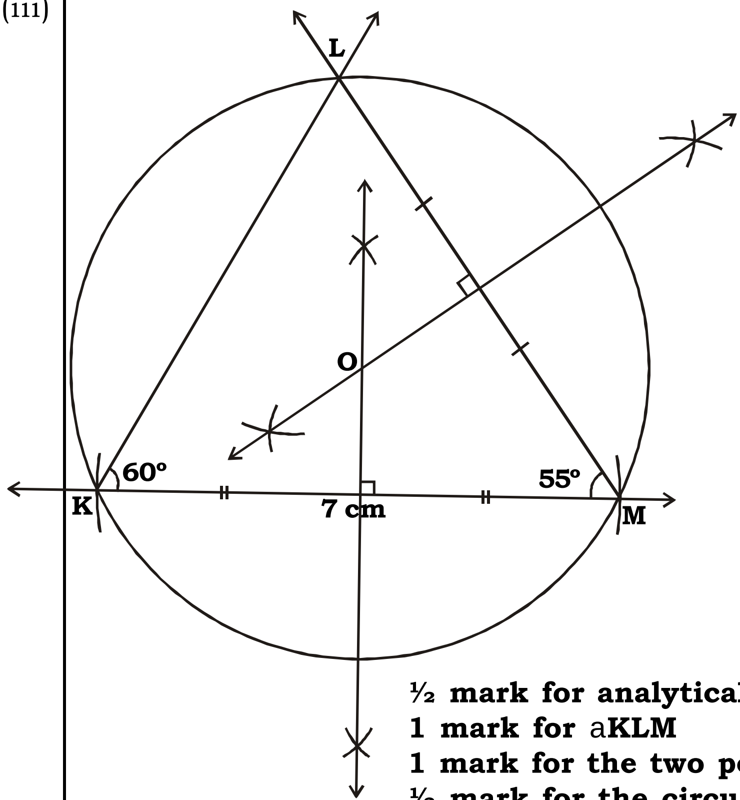
y m ĎRAQ = 24° – 13°

y m ĎRAQ = 11° ½

(iii)

(Analytical Figure)





½ mark for analytical figure
1 mark for aKLM
1 mark for the two perpendicular bisectors
½ mark for the circumcircle

(iv)	$\sec \sim = \frac{2}{\sqrt{3}}$	
	$\cos \sim = \frac{1}{\sec \sim}$	
	$= \frac{1}{2/\sqrt{3}}$	
	y $\cos \sim = \frac{\sqrt{3}}{2}$	½
	$\sin^2 \sim + \cos^2 \sim = 1$	
	y $\sin^2 \sim + \left(\frac{\sqrt{3}}{2}\right)^2 = 1$	½
	y $\sin^2 \sim + \frac{3}{4} = 1$	
	y $\sin^2 \sim = 1 - \frac{3}{4}$	
	y $\sin^2 \sim = \frac{4-3}{4}$	
	y $\sin^2 \sim = \frac{1}{4}$	
	y $\sin \sim = \frac{1}{2}$ [Taking square roots]	½
	$\operatorname{cosec} \sim = \frac{1}{\sin \sim}$	
	$= \frac{1}{1/2}$	
	$\operatorname{cosec} \sim = 2$	½
	~ is in IV quadrant	
	y $\operatorname{cosec} \sim = -2$	
	$\frac{1 - \operatorname{cosec} \sim}{1 + \operatorname{cosec} \sim} = \frac{1-(-2)}{1+(-2)}$	½
	y $\frac{1 - \operatorname{cosec} \sim}{1 + \operatorname{cosec} \sim} = \frac{1+2}{1-2}$	
	y $\boxed{\frac{1 - \operatorname{cosec} \sim}{1 + \operatorname{cosec} \sim} = -3}$	½

(v) Let,A ø (x, – 2) ø (x_1, y_1)

B ø (8, – 11) ø (x_2, y_2)

Slope of line AB = $\frac{-3}{4}$ [Given]

Slope of line AB = $\frac{y_2 - y_1}{x_2 - x_1}$ ½

y $\frac{-3}{4} = \frac{-11-(-2)}{8-x}$ ½

y $\frac{-3}{4} = \frac{-11+2}{8-x}$

y $\frac{-3}{4} = \frac{-9}{8-x}$ ½

y $3(8-x) = 9 \times 4$

y $24 - 3x = 36$ ½

y $3x = 24 - 36$

y $3x = -12$

y $x = \frac{-12}{3}$ ½

y $x = -4$

y **The value of x is – 4.** ½

A.4. Solve ANY TWO of the following :

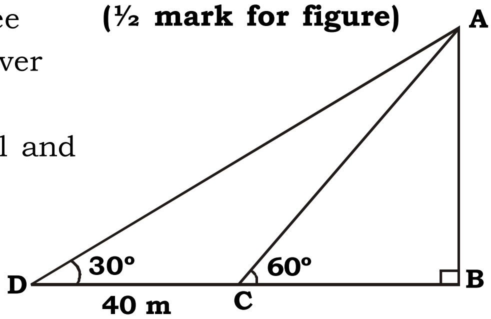
(i) Let seg AB represents the tree **(½ mark for figure)**

seg BC represents width of river ½

Let BC = x m

C and D represents the initial and final positions of the observer

DC = 40 m



ĎACB and ĎADB are the angles of elevation

m ĎACB = 60° and m ĎADB = 30°

In right angled aACB,

tan 60° = $\frac{AB}{BC}$ [By definition] ½

y $\sqrt{3} = \frac{AB}{x}$

y $AB = \sqrt{3}\,x$ m .....(i) ½

In right angled aADB,

tan 30° = $\frac{AB}{DB}$ [By definition] ½

y $\frac{1}{\sqrt{3}}$ = $\frac{AB}{40 + x}$

y AB = $\frac{40 + x}{\sqrt{3}}$ m .....(ii) ½

From (i) and (ii) we get,

$\sqrt{3}\,x$ = $\frac{40 + x}{\sqrt{3}}$

y 3x = 40 + x

y 3x – x= 40

y 2x = 40

y x = 20

y BC = 20 m ½

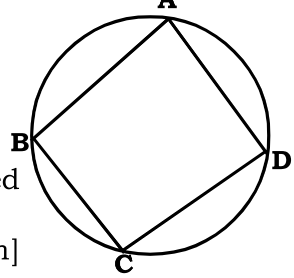
y AB = $20\sqrt{3}$ m [From (i)]

y AB = 20 × 1.73

y AB = 34.6 m

y Height of tree is 34.6 m and width of river is 20 m. ½

(ii) **Given :** □ABCD is a cyclic **(½ mark for figure)**



To Prove : m ĎABC + m ĎADC = 180° ½

m ĎBAD + m ĎBCD = 180°

Proof :

m ĎABC = $\frac{1}{2}$ m (arc ADC) .....(i)

m ĎADC = $\frac{1}{2}$ m (arc ABC) .....(ii) [Inscribed angle theorem] 1

Adding (i) and (ii), we get

m ĎABC + m ĎADC = $\frac{1}{2}$ m (arc ADC) + $\frac{1}{2}$ m (arc ABC)

y m ĎABC + m ĎADC = $\frac{1}{2}$ [m (arc ADC) + m (arc ABC)] ½

y m ĎABC + m ĎADC = $\frac{1}{2}$ × 360° [∵ Measure of a circle is 360°] ½

y **m ĎABC + m ĎADC = 180° ....(iii)**

In □ABCD,

m ĎBAD + m ĎBCD + m ĎABC + m ĎADC = 360°

[∵ Sum of measure of angles of a quadrilateral is 360°] ½

y m ĎBAD + m ĎBCD + 180° = 360° [From (iii)]

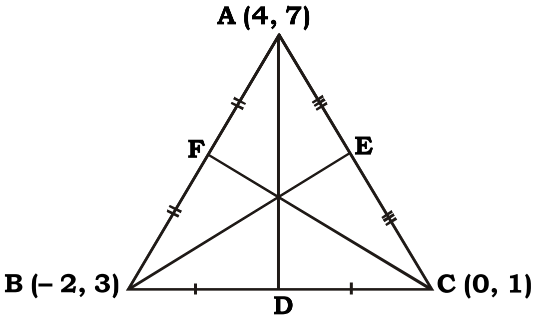
y **m ĎBAD + m ĎBCD = 180°** ½

(iii) A ø (4, 7), B ø (– 2, 3), C ø (0, 1)

Let, seg AD, seg BE and seg CF be the medians on sides BC, AC and AB respectively.

y D, E and F are the midpoints of sides BC, AC and AB respectively.

By midpoint formula,



D ø $\left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2}\right)$ ½

ø $\left(\frac{-2 + 0}{2}, \frac{3 + 1}{2}\right)$

ø $\left(\frac{-2}{2}, \frac{4}{2}\right)$

ø (– 1, 2) ½

E ø $\left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2}\right)$

ø $\left(\frac{4 + 0}{2}, \frac{7 + 1}{2}\right)$

ø $\left(\frac{4}{2}, \frac{8}{2}\right)$

ø (2, 4) ½

F ø $\left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2}\right)$

ø $\left(\frac{4 + (-2)}{2}, \frac{7 + 3}{2}\right)$

ø $\left(\frac{4 - 2}{2}, \frac{10}{2}\right)$

ø $\left(\frac{2}{2}, 5\right)$

ø (1, 5) ½

By two point form,
The equation of median AD,

$$\frac{x - x_1}{x_1 - x_2} = \frac{y - y_1}{y_1 - y_2}$$ ½

y $$\frac{x - 4}{4 - (-1)} = \frac{y - 7}{7 - 2}$$

y $$\frac{x - 4}{4 + 1} = \frac{y - 7}{5}$$

y $$\frac{x - 4}{5} = \frac{y - 7}{5}$$

y $x - 4 = y - 7$

y $x - y - 4 + 7 = 0$

y $x - y + 3 = 0$ ½

The equation of the median BE

$$\frac{x - x_1}{x_1 - x_2} = \frac{y - y_1}{y_1 - y_2}$$

y $$\frac{x - (-2)}{-2 - 2} = \frac{y - 3}{3 - 4}$$

y $$\frac{x + 2}{-4} = \frac{y - 3}{-1}$$

y $x + 2 = 4\ (y - 3)$

y $x + 2 = 4y - 12$

y $x - 4y + 2 + 12 = 0$

y $x - 4y + 14 = 0$ ½

The equation of the median CF

$$\frac{x - x_1}{x_1 - x_2} = \frac{y - y_1}{y_1 - y_2}$$

y $$\frac{x - 0}{0 - 1} = \frac{y - 1}{1 - 5}$$

y $$\frac{x}{-1} = \frac{y - 1}{-4}$$

y $4x = y - 1$

y $4x - y + 1 = 0$

y **The equation of the medians of aABC are $x - y + 3 = 0$, $x - 4y + 14 = 0$ and $4x - y + 1 = 0$** ½

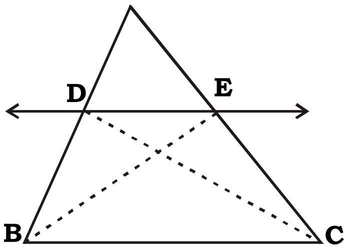
A.5. **Solve ANY TWO of the following :** **(½ mark for figure)**

(i) **Given:** In ΔABC,

(i) Line l || side BC

(ii) Line intersects sides AB and AC at points D and E respectively. ½

A - D - B, A - E - C



To Prove : $\frac{AD}{DB} = \frac{AE}{EC}$

Construction : Draw seg BE and seg CD. ½

Proof : ΔADE and ΔBDE have a common vertex E and their bases AD and BD lie on the same line AB.

∴ Their heights are equal

∴ $\frac{A(aADE)}{A(aBDE)} = \frac{AD}{DB}$ ...(i) [Triangles having equal heights] ½

ΔADE and ΔCDE have a common vertex D and their bases AE and EC lie on the same line AC. ½

∴ Their heights are equal.

∴ $\frac{A(aADE)}{A(aCDE)} = \frac{AE}{CE}$ ...(ii) [Triangles having equal heights] ½

line DE || side BC [Given]

ΔBDE and ΔCDE are between the same two parallel lines DE and BC. ½

∴ Their heights are equal.

Also, they have same base DE.

∴ A(ΔBDE) = A(ΔCDE) ...(iii) [Areas of two triangles having equal bases and equal heights are equal] ½

∴ $\frac{A(aADE)}{A(aBDE)} = \frac{A(aADE)}{A(aCDE)}$ ...(iv) [From (i), (ii) and (iii)] ½

∴ $\mathbf{\frac{AD}{DB} = \frac{AE}{EC}}$ [From (i), (ii) and (iv)] ½

(ii) aLTR ~ aHYD [Given]

y $\frac{LT}{HY} = \frac{TR}{YD} = \frac{LR}{HD} = \frac{5}{6}$ .....(i) [c.s.s.t.]

ĎT = ĎY = 40° [c.a.s.t.]

y $\frac{LT}{HY} = \frac{5}{6}$ [From (i)]

y $\frac{LT}{7.2} = \frac{5}{6}$

y $LT = \frac{36}{6}$

y LT = 6

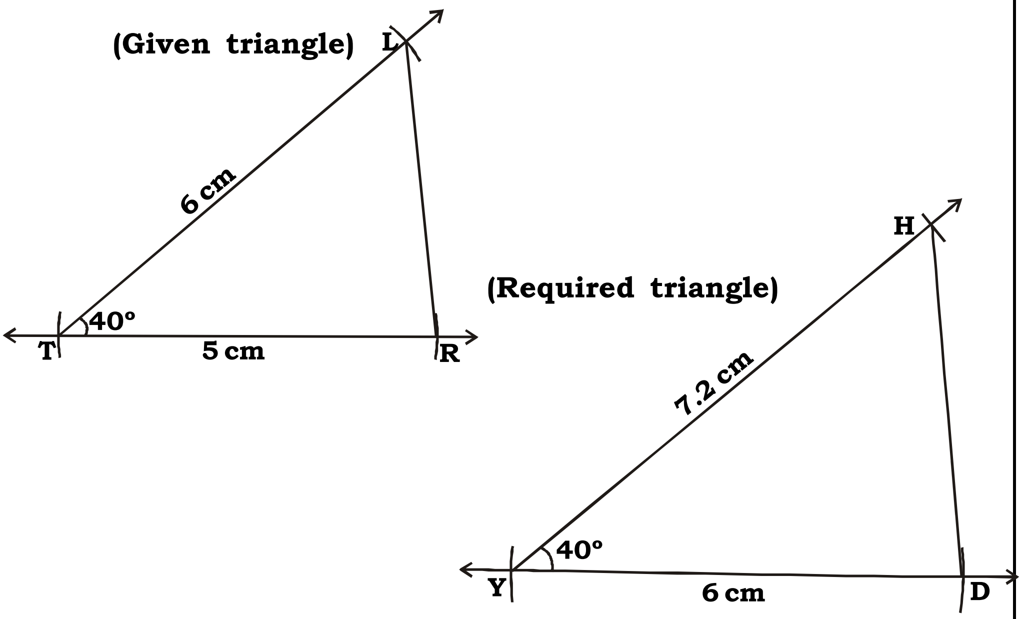
y $\frac{TR}{YD} = \frac{5}{6}$ [From (i)] 2

y $\frac{TR}{6} = \frac{5}{6}$

y $TR = \frac{30}{6}$

y TR = 5

Information for constructing aHYD is complete.



1½

1½

(iii) Diameter of conical vessel = 40 cm

y Its radius (r) = $\frac{40}{2}$ = 20cm ½

Its depth (h) = 24 cm

Volume of conical vessel = $\frac{1}{3}$®r^2h ½

= $\frac{1}{3}$ × ® × 20 × 20 × 24

= 20 × 20 × 8 × ®

= 3200® cm^3 ½

Diameter of cylindrical pipe = 20 mm

y Its radius (r_1) = $\frac{20}{2}$ ½

= 10 mm

= $\frac{10}{10}$ cm [∵ 1 cm = 10 mm]

= 1 cm

Water flowing in 1 minute (h) = 10 m

= 10 × 100 cm [∵ 1 m = 100 cm] ½

= 1000 cm

Volume of water flowing in 1 minute through a cylindrical pipe

= ®r_1^2h

= ® × 1 × 1 × 1000

= 1000 ®cm^3 ½

Time taken to fill conical vessel

= $\frac{\text{Volume of conical vessel}}{\text{Volume of water flowing in 1 minute}}$ ½

= $\frac{3200®}{1000®}$ ½

= $\frac{32}{10}$ mins

= $\frac{32}{10} \times 60$ secs [∵ 1 minute = 60 seconds] ½

= 192 seconds

= 3 minutes and 12 seconds

y The time taken to fill the conical vessel is 3 minutes and 12 seconds. ½

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