PRACTICE MCQs

CLASS 10 MATHS (TERM - I)

TRIANGLES

BY

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learning simplified

Question 1:

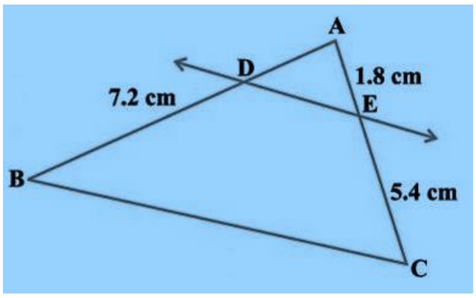
In the given figure, DE || BC, then the value of AD is

(a) 1.4 cm

(b) 1.8 cm

(c) 2.4 cm

(d) 2.8 cm



Answer: (c) 2.4 cm

Let AD = x cm

Given that DE || BC, therefore using Thales theorem, we get

AD/DB = AC/EC

=> x/7.2 = 1.8/5.4

=> x/7.2 = 1/3

=> x = 7.2/3

=> x = 2.4

Hence, AD = 2.4 cm

Question 2:

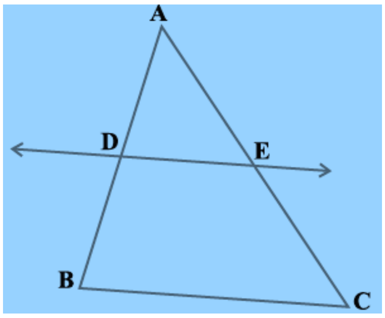
If a line intersects sides AB and AC of a Δ ABC at D and E respectively and is parallel to BC as a shown in the given figure, then

(a) AD/AB = AE/AC

(b) AD/AC = AE/AB

(c) AD^2 = AE * AC

(d) None of these



Answer: (a) AD/AB = AE/AC

Given, DE || BC

So, AD/DB = AE/EC

[If a line is drawn parallel to one side of a triangle to intersect the other two sides in distinct points, the other two sides are divided in the same ratio.]

=>DB/AD = EC/AE

=>DB/AD + 1 = EC/AE + 1

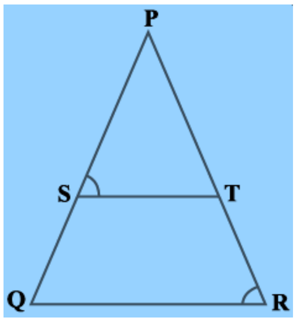
=> (DB + AD)/AD = (EC + AE)/AE

=>AB/AD = AC/AE

=>AD/AB = AE/AC

Question 3:

In the given figure, if PS/SQ = PT/TR and ∠PST = ∠PRQ. Then PQR is a/an _______ triangle.



(a) Equilateral

(b) Isosceles

(c) Scalene

(d) Right angle

Answer:(b) Isosceles

Given, PS/SQ = PT/TR

=>ST || QR

[If a line divides any two sides of a triangle in the same ratio, then the line is parallel to the third side.]

So, ∠PST = ∠PQR (Corresponding angles) 1

Also, it is given that

∠PST = ∠PRQ 2

So, ∠PRQ = ∠PQR [From equation 1 and 2]

Therefore, PQ = PR [Sides opposite the equal angles]

=> PQR is an isosceles triangle.

Question 4:

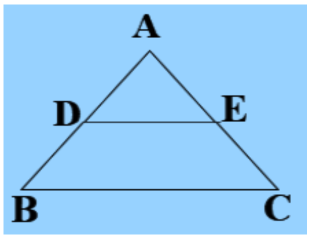
In the figure, if DE ∥ BC, AD = 3 cm, BD = 4 cm and BC = 14 cm, then DE equals

(a) 7 cm

(b) 6 cm

(c) 4 cm

(d) 3 cm



Answer: (b) 6 cm

Since DE || BC

So, ∠ADB = ∠ABD [Corresponding Angle]

And ∠AED = ∠ACB [Corresponding Angle]

Therefore, by AA Similarity,

ΔADE ~ ΔABC

Now, in similar triangle, sides are proportional

=> AD/DB = DE/BC

=> 3/(3 + 4) = DE/14

=> 3/7 = DE/14

=> 3 = DE/2

=> DE = 6 cm

Question 5:

If two angles of one triangle are respectively equal to two angles of another triangle, then the two triangles are similar. This is known as _____ similarity criterion.

(a) SSS

(b) SAS

(c) ASA

(d) AA

Answer: (d) AA

If two angles of one triangle are respectively equal to two angles of another triangle, then the two triangles are similar. This is known as AA similarity criterion.

Question 6:

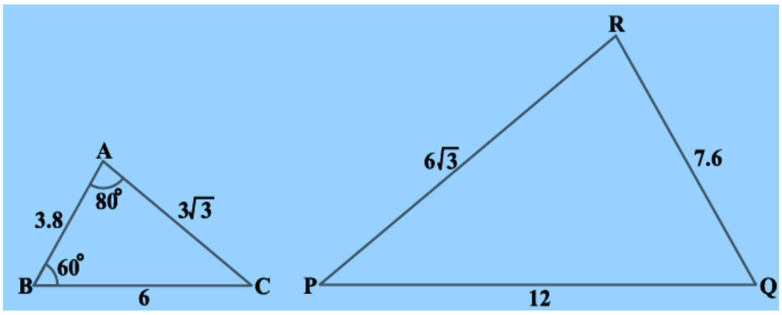
The value of ∠P in the given figure, is

(a) 20°

(b) 30°

(c) 40°

(d) 50°



Answer: (c) 40°

In Δ ABC and Δ PQR,

AB/RQ = 3.8/7.6 = 1/2

BC/QP = 6/12 = 1/2

And CA/PR = 3√3/6√3 = 1/2

So, AB/RQ = BC/QP = CA/PR

=> Δ ABC ~ Δ RQP [SSS similarity]

Therefore, ∠C = ∠P [Corresponding angles of similar triangles]

But ∠C = 180° – ∠A – ∠B [Angle sum property]

= 180° – 80° – 60°

= 40°

So, ∠ P = 40°

Question 7:

A girl of height 90 cm is walking away from the base of a lamp-post at a speed of 1.2 m/s. If the lamp is 3.6 m above the ground then the length of her shadow after 4 seconds is

(a) 1.2 m

(b) 1.4 m

(c) 1.6 m

(d) 1.8 m

Answer: (c) 1.6 m

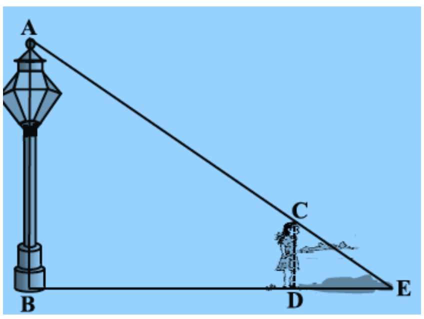
Let AB denote the lamp-post and CD the girl after walking for 4 seconds away from the lamp-post as shown in the figure.

From the figure, we can see that DE is the shadow of the girl. Let DE be x metres.

Now, BD = 1.2 m * 4 = 4.8 m.

Note that in Δ ABE and Δ CDE,

∠B = ∠D [Each is of 90° because lamp-post as well as the girl are standing vertical to the ground]



and ∠E = ∠E [Same angle]

So, Δ ABE ~ Δ CDE [AA similarity criterion]

Therefore,

BE/DE=AB/CD

=> (4.8 + x)/x = 3.6/0.9 [90 cm =90/100 m = 0.9 m]

=> (4.8 + x)/x = 4

=> 4.8 + x = 4x

=> 3x = 4.8

=> x = 1.6

So, the shadow of the girl after walking for 4 seconds is 1.6 m long.

Question 8:

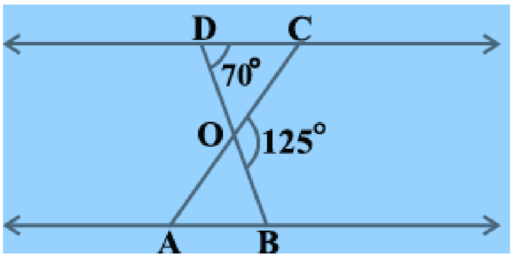
In the given figure, Δ ODC ~ Δ OBA, ∠BOC = 125°and ∠CDO = 70° then the value of ∠DOC is

(a) 35°

(b) 55°

(c) 75°

(d) 85°



Answer: (b) 55°

Since DOB is a straight line

So, ∠DOC + ∠COB = 180°

=>∠DOC + 125° = 180°

=>∠DOC = 180° - 125°

=>∠DOC = 55°

Question 9:

Let Δ ABC ~ Δ DEF and their areas be, respectively, 64 cm^2 and 121 cm^2. If EF = 15.4 cm, then BC =

(a) 5.2 cm

(b) 8.2 cm

(c) 11.2 cm

(d) 15.2 cm

Answer: (c) 11.2 cm

Given, Δ ABC ~ Δ DEF

So, ar(ABC)/ar(DEF) = $AB^2/DE^2 = BC^2/EF^2 = AC^2/DF^2$

Given, ar(ABC) = 64 cm^2, ar(DEF) = 64 cm^2, EF = 15.4 cm

=>ar(ABC)/ar(DEF) = BC^2/EF^2

=> 64/121 = $BC^2/(15.4)^2$

Take square root on both sides, we get

=> 8/11 = BC/15.4

=> BC = (15.4 * 8)/11

=> BC = 1.4 * 8

=> BC = 11.2 cm

Question 10:

ABC and BDE are two equilateral triangles such that D is the mid-point of BC.

Ratio of the areas of triangles ABC and BDE is

(a) 2 : 1

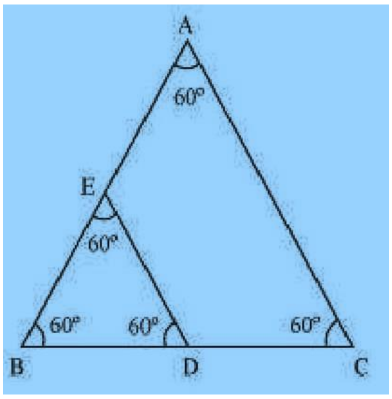
(b) 1 : 2

(c) 4 : 1

(d) 1 : 4

Answer: (c) 4 : 1

Both the triangles are equilateral and each angle of both the triangles are 60^0.



Therefore, by AAA similarity,

Δ BCA ~ Δ BDE

Therefore, the side of Δ BDE = x/2

Now, ar(Δ ABC)/ar (Δ BDE) = $(x/x/2)^2$

$= x^2/(x^2/4)$

= 4/1

=>ar(Δ ABE) : ar (Δ BDE) = 4 : 1

Question 11:

Sides of two similar triangles are in the ratio 4 : 9. Areas of these triangles are in the ratio

(a) 2 : 3

(b) 4 : 9

(c) 81 : 16

(d) 16 : 81

Answer: (d) 16 : 81

We know that the ration of similar triangles is equal to the ratio of square of their corresponding sides.

Therefore, the ratio of areas of two triangles = $(4/9)^2$

= 16/81

= 16 : 81

Question12:

$\Delta ABC \sim \Delta PQR$. If AM and PN are altitudes of ΔABC and ΔPQR respectively and $AB^2 : PQ^2 = 4 : 9$, then AM : PN =

(a) 16 : 81

(b) 4 : 9

(c) 3 : 2

(d) 2 : 3

Answer: (d) 2 : 3

Given, $AB^2 : PQ^2 = 4 : 9$

=> $AB^2/PQ^2 = 4/9$

=> $AB^2/PQ^2 = (4/9)^2$

=> $AB^2/PQ^2 = 2/3$

When two triangles are similar, then

Ratio of their altitudes = ratio of their sides

=> AM/PN = AB/PQ

=> AM/PN = 2/3

=>AM : PN = 2 : 3

Question13:

An aeroplane leaves an airport and flies due north at a speed of 1000 km per hour. At the same time, another aeroplane leaves the same airport and flies due west at a speed of 1200 km per hour. How far apart will be the two planes after 1½ hours?

(a) $30\sqrt{61}$ km

(b) $300\sqrt{61}$ km

(c) $3000\sqrt{61}$ km

(d) None of these

Answer: (b) 300√61 km

Distance travelled by first aeroplane(due north) in 1½ hours = 1000 * 3/2

= 3000/2

= 1500 km

Distance travelled by second aeroplane(due north) in 1½ hours = 1200 * 3/2

= 3600/2

= 1800 km

Now, OA and OB are the distance travelled.

By Pythagoras theorem, the distance between two lanes

$AB = \sqrt{(OA^2 + OB^2)}$

$\Rightarrow AB = \sqrt{(1500^2 + 1800^2)}$

$\Rightarrow AB = \sqrt{(2250000 + 3240000)}$

$\Rightarrow AB = \sqrt{(5490000)}$

$\Rightarrow AB = 300\sqrt{61}$ km

Hence, in 1½ hours, the distance between two planes is 300√61 km.

Question14:

In an equilateral triangle ABC, D is a point on side BC such that BD = BC/3. Then

(a) $7 AD^2 = 9 AB^2$

(b) $5 AD^2 = 7 AB^2$

(c) $7 AD^2 = 5 AB^2$

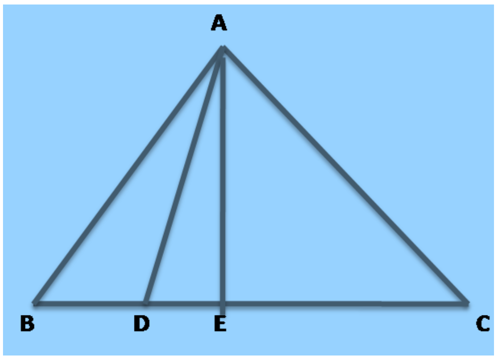
(d) $9 AD^2 = 7 AB^2$

Answer: (d) $9 AD^2 = 7 AB^2$

From the figure, $AD = a\sqrt{3}/2$ and $DE = a/6$

Now, in triangle ADE,

$AD^2 = AE^2 + DE^2$



=> $AD^2 = 3a^2/4 + a^2/36$

=> $AD^2 = 28a^2/36$

=> $AD^2 = 7a^2/9$

=> $9\ AD^2 = 7a^2$

=> $9\ AD^2 = 7AB^2$

Question15:

In Δ ABC, AB = 6√3 cm, AC = 12 cm and BC = 6 cm. The angle B is:

(a) 120°

(b) 60°

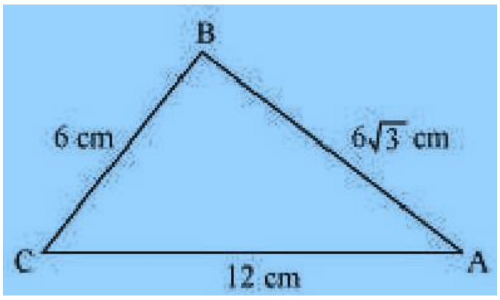
(c) 90°

(d) 45°

Answer: (c) 90°

Given, AB = 6√3 cm, AC = 12 cm and BC = 6 cm

Therefore, $AB^2 = (6\sqrt{3})^2 = 108$



$AC = 12^2 = 144$

$BC = 6^2 = 36$

Now, $AB^2 + BC^2 = 108 + 36$

$= 144$

$= AC^2$

The sides are satisfying the Pythagoras triplet in ΔABC.

Hence, these are the sides of a right angle triangle.

So, $\angle B = 90°$

Question16:

Sides of triangles are given below. Which of them are right triangles?

(a) 3 cm, 8 cm, 6 cm

(b) 50 cm, 80 cm, 100 cm

(c) 13 cm, 12 cm, 5 cm

(d) All of above

Answer: (c) 13 cm, 12 cm, 5 cm

(a) Sides of triangle are: 3 cm, 8 cm, 6 cm

Square these sides, we get 9, 64 and 36

Now, $9 + 36 \neq 64$

=> $3^2 + 6^2 \neq 8^2$

These sides do not satisfy the Pythagoras theorem; hence these are not sides of right angled triangle.

(b) Sides of triangle are: 50 cm, 80 cm, 100 cm

Square these sides, we get 2500, 6400 and 10000

Now, $2500 + 6400 \neq 10000$

=> $50^2 + 80^2 \neq 100^2$

These sides do not satisfy the Pythagoras theorem; hence these are not sides of right angled triangle.

(c) Sides of triangle are: 13 cm, 12 cm, 5 cm

Square these sides, we get 169, 144 and 25

Now, 25 + 144 = 169

=> $5^2 + 12^2 = 13^2$

These sides satisfy the Pythagoras theorem; hence these are sides of right angled triangle.

Question 17:

ΔABC is such that AB = 3 cm, BC = 2 cm, CA = 2.5 cm. If ΔABC ~ ΔDEF and EF = 4cm, then perimeter of ΔDEF is

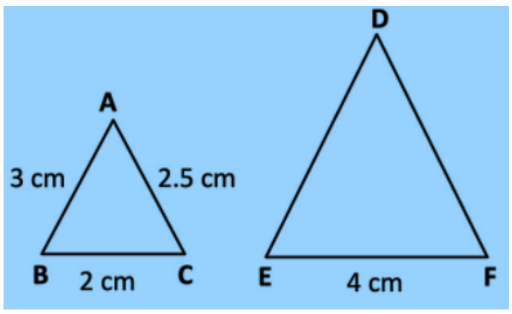
(a) 7.5 cm

(b) 15 cm

(c) 22.5 cm

(d) 30 cm

Answer: (b) 15 cm



Given, ΔABC ~ ΔDEF

So, sides will be proportional

=> AB/DE = BC/EF = AC/DF

=> 3/DE = 2/4 = 2.5/DF

=> 3/DE = 1/2 = 2.5/DF

=> 3/DE = 1/2 and 1/2 = 2.5/DF

=> DE = 3 * 2 and DF = 2 * 2.5

=> DE = 6 cm and DF = 5 cm

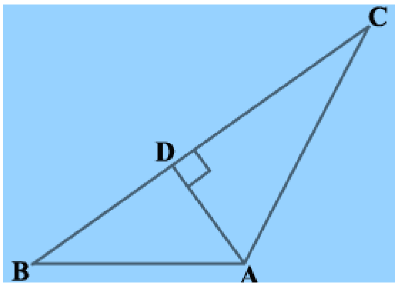
Now, perimeter of ΔDEF = DE + EF + DF

= 6 + 4 + 5

= 15 cm

Question 18:

In the given figure if AD ⊥ BC, then



(a) AB + CD = BD + AC

(b) $AB^2 + CD^2 = BD^2 + AC^2$

(c) $(AB + CD)^2 = (BD + AC)^2$

(d) None of above

Answer: (b) $AB^2 + CD^2 = BD^2 + AC^2$

From Δ ADC, we have

$AC^2 = AD^2 + CD^2$ [Pythagoras Theorem] …………1

From Δ ADB, we have

$AB^2 = AD^2 + BD^2$ [Pythagoras Theorem] ………..2

Subtracting equation 1 from 2, we have

$AB^2 – AC^2 = BD^2 – CD^2$

=> $AB^2 + CD^2 = BD^2 + AC^2$

Question 19:

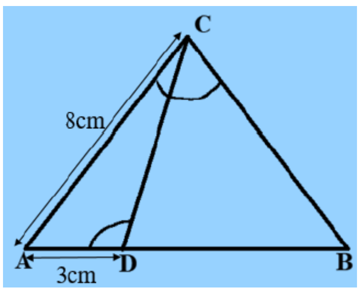
In the given figure, ∠ACB = ∠CDA, AC = 8 cm, AD = 3 cm, then BD is

(a) 22/3 cm

(b) 26/3 cm

(c) 55/3 cm

(d) 64/3 cm



Answer: (c) 55/3 cm

Given, ∠ACB = ∠CDA

Now, in ΔACB and ΔADC

∠ACB = ∠ADC [Given]

∠CAB = ∠DAC [Common]

So, ΔACB ~ ΔADC [AA Similarity]

Now, in similar triangle, sides are in same proportion

=> AC/AD = AB/AC

=> 8/3 = AB/8

=> AB = 64/3

Now, BD = AB – AD

= 64/3 – 3

= (64 – 9)/3

= 55/3 cm

Question 20:

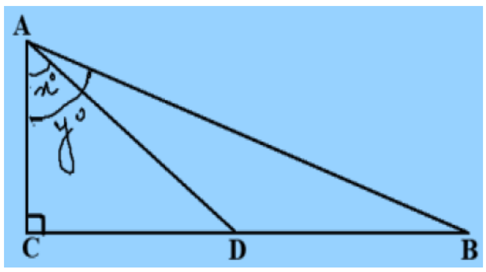
In the given figure, D is the mid-point of BC, then the value of cot$y$°/cot$x$° is

(a) 2

(b) 1/2

(c) 1/3

(d) 1/4



Answer: (b) 1/2

Given, D is the mid-point of BC.

Let CD = BD = a

Now, cot y°/cot x° = (1/tan y°)/(1/tan x°)

= tan x°/tan y°

= (CD/AC)/(BC/AC)

= (a/AC)/(2a/AC)

= 1/2

Question 21:

Which of the following is not a similarity criterion for two triangles?

(a) AAA

(b) SAS

(c) SSS

(d) ASA

Answer: (d) ASA

The main criteria for similarity of two triangles are AAA, AA, SAS and SSS.

Question 22:

The ratio of the areas of two similar triangles is equal to

(a) square of the ratio of their corresponding sides

(b) cube of the ratio of their corresponding sides

(c) square root of the ratio of their corresponding sides

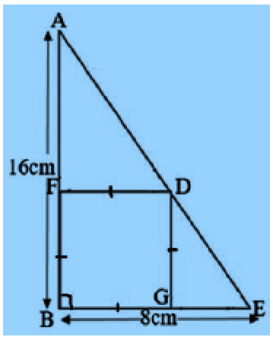
(d) twice the ratio of their corresponding sides

Answer: (a) square of the ratio of their corresponding sides

The ratio of the areas of two similar triangles is equal to the square of the ratio of their corresponding sides.

Question 23:

Sides AB and BE of a right triangle, right angled at B are of lengths 16 cm and 8 cm respectively. The length of the side of largest square FDGB that can be inscribed in the triangle ABE is



(a) 32/3cm

(b) 16/3cm

(c)8/3cm

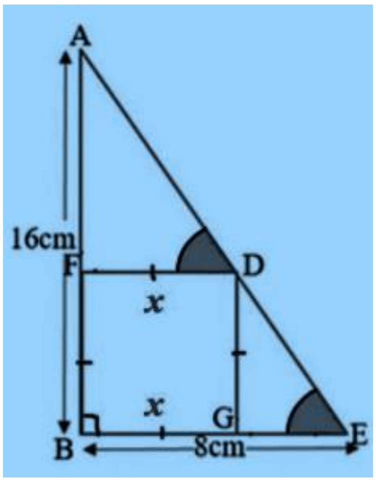
(d) 4/3cm

Answer: (b) 16/3 cm

Let FDGB is a square having side x cm.

For parallel lines FD and CE with transversal AE

∠ADF = ∠AEB [Corresponding angles] ……….1



Again, FDGB is a square, then

∠AFD = 90^0 and ∠DGF = 90^0

Now, in ΔAFD and ΔDGC

∠AFD = ∠DGF [both are 90^0]

∠ADF = ∠AEB [From equation 1]

So, ΔAFD ~ ΔDGF [AA Similarity]

Now, in similar triangle, sides are in same proportion

=> AF/DG = FD/GE

=> (16 - x)/x = x/(8 - x)

=> (16 - x)(8 - x) = x^2

=> 128 – 16x – 8x + x^2 = x^2

=> 128 – 24x = 0

=> 24x = 128

=> x = 128/24

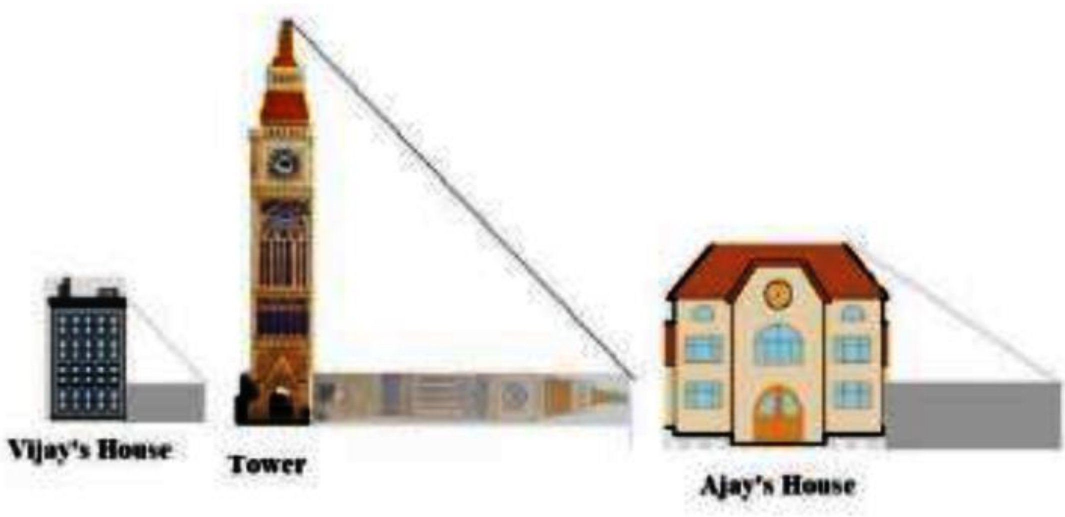
=> x = 16/3 cm

Case study based questions

Question 24:

Read the following text and answer the question the following questions.

Vijay is trying to find the average height of a tower near his house. He is using the properties of similar triangles. The height of Vijay's house if 20m when Vijay's house casts a shadow 10m long on the ground. At the same time, the tower casts a shadow 50m long on the ground and the house of Ajay casts 20m shadow on the ground.



(i). What is the height of the tower?

(a) 20m

(b) 50m

(c) 100m

(d) 200m

(ii). What will be the length of the shadow of the tower when Vijay's house casts a shadow of 12m?

(a) 75m

(b) 50m

(c) 45m

(d) 60m

(iii). What is the height of Ajay's house?

(a) 30m

(b) 40m

(c) 50m

(d) 20m

(iv). When the tower casts a shadow of 40m, same time what will be the length of the shadow of Ajay's house?

(a) 16m

(b) 32m

(c) 20m

(d) 8m

(v). When the tower casts a shadow of 40m, same time what will be the length of the shadow of Vijay's house?

(a) 15m

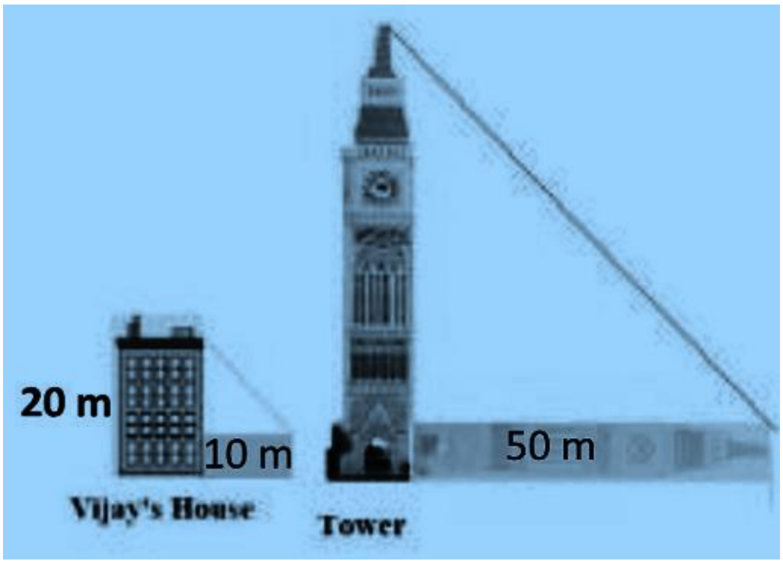
(b) 32m

(c) 16m

(d) 8m

Answers:

(i). (c) 100 m



Since the triangles are similar, so their sides are proportional.

=> Height of Vijay's house/Length of shadow of Vijay's house = Height of Tower/Length of shadow of Tower

=>20/10 = Height of Tower/50

=> 2 = Height of Tower/50

=> Height of Tower = 2 * 50

=> Height of Tower = 100 m

(ii). (d) 60 m

Given, Vijay's house casts a shadow of 12 m, then

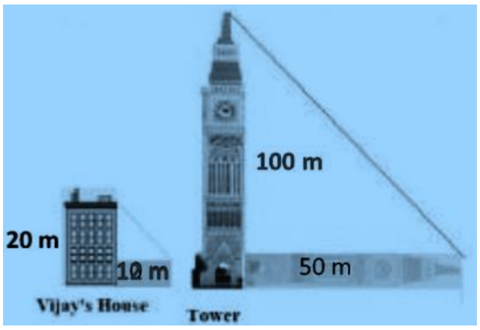
=> Height of Vijay's house/Length of shadow of Vijay's house = Height of Tower/Length of shadow of Tower

=>20/12 = 100/Length of shadow of Tower

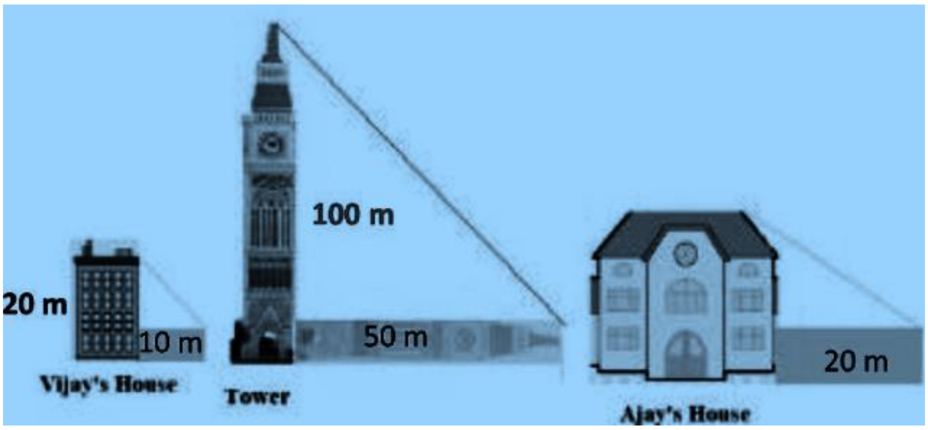
=> Length of shadow of Tower = 100 * (12/20)

=> Length of shadow of Tower = 5 * 12

=> Length of shadow of Tower = 60 m



(iii). (b) 40 m



Since the triangles are similar, so their sides are proportional.

=> Height of Vijay's house/Length of shadow of Vijay's house = Height of Ajay's House/Length of shadow of Ajay's house

=>20/10 = Height of Ajay's House /20

=> 2 = Height of Ajay's House /20

=> Height of Ajay's House = 2 * 20

=> Height of Ajay's House = 40 m

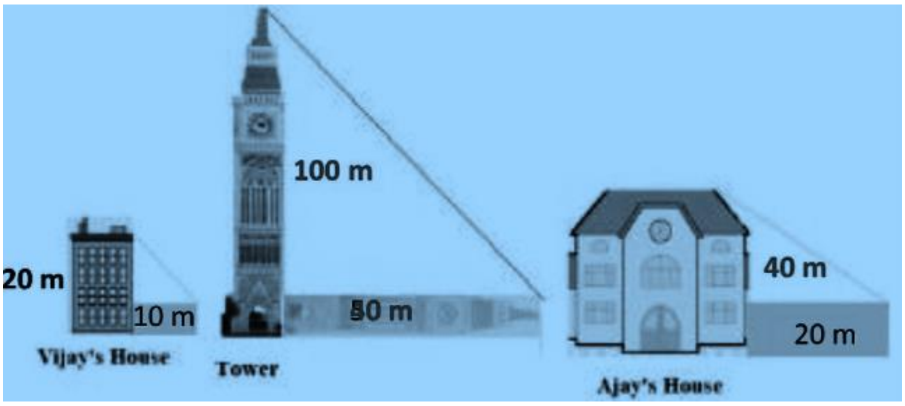
(iv). (a) 16 m

Since the triangles are similar, so their sides are proportional.

=> Height of Tower/Length of shadow of Tower = Height of Ajay's House/Length of shadow of Ajay's house

=>100/40 = 40/Length of shadow of Ajay's house

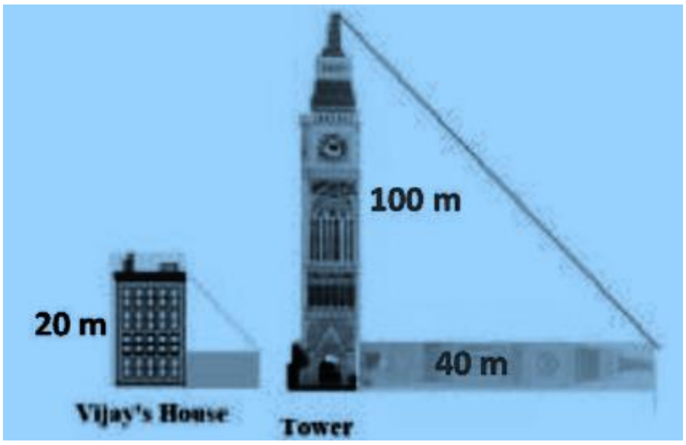
=> Length of shadow of Ajay's house = 40 * (40/100)



=> Length of shadow of Ajay's house = 4 * 4

=> Length of shadow of Ajay's house = 16 m

(v). (d) 8 m



Since the triangles are similar, so their sides are proportional.

=> Height of Tower/Length of shadow of Tower = Height of Vijay's House/Length of shadow of Vijay's house

=>100/40 = 20/Length of shadow of Vijay's house

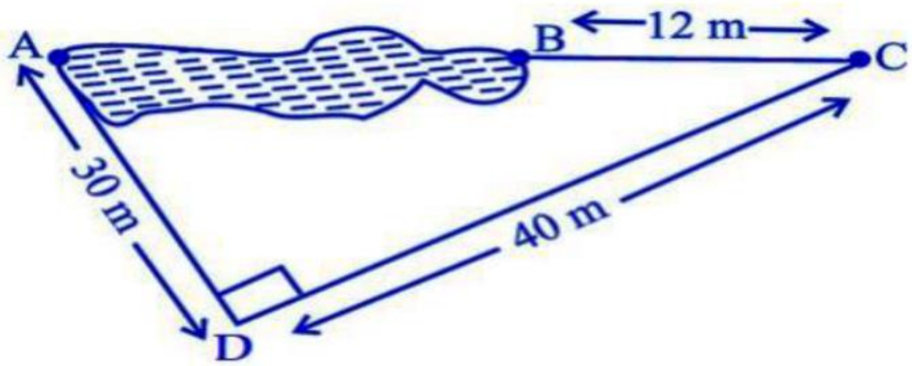
=>Length of shadow of Vijay's house = 20 * (40/100)

=>Length of shadow of Vijay's house = 2 * 4

=>Length of shadow of Vijay's house = 8 m

Question 25:

Rohan wants to measure the distance of a pond during the visit to his native. He marks points A and B on the opposite edges of a pond as shown in the figure below. To find the distance between the points, he makes a right-angled triangle using rope connecting B with another point C are a distance of 12m, connecting C to point D at a distance of 40m from point C and the connecting D to the point A which is are a distance of 30m from D such that $\angle ADC = 90^0$.



(i). Which property of geometry will be used to find the distance AC?

(a) Similarity of triangles

(b) Thales Theorem

(c) Pythagoras Theorem

(d) Area of similar triangles

(ii). What is the distance AC?

(a) 50 m

(b) 12 m

(c) 100 m

(d) 70 m

(iii).Which is the following does not form a Pythagoras triplet?

(a) (7, 24, 25)

(b) (15, 8, 17)

(c) (5, 12, 13)

(d) (21, 20, 28)

(iv). Find the length AB?

(a) 12 m

(b) 38 m

(c) 50 m

(d) 100 m

(v). Find the length of the rope used.

(a) 120 m

(b) 70 m

(c) 82 m

(d) 22 m

Answer:

(i). (c) Pythagoras Theorem

ΔADC is a right angle triangle right angled at D.

The length of two sides AD and CD are already given.

Now, using Pythagoras Theorem, we can find the value of AC.

(ii). (a) 50 m

In ΔADC,

Using Pythagoras Theorem,

$AC^2 = AD^2 + CD^2$

=> $AC^2 = 30^2 + 40^2$

=> $AC^2 = 900 + 1600$

=> $AC^2 = 2500$

=> $AC = \sqrt{(2500)}$

=> AC = 50 m

(iii). (d) (21, 20, 28)

(a) (7, 24, 25)

Now, $7^2 + 24^2 = 49 + 576$

$= 625$

$= 25^2$

Hence, this is a Pythagoras triplet.

(b) (15, 8, 17)

Now, $15^2 + 8^2 = 225 + 64$

$= 289$

$= 17^2$

Hence, this is a Pythagoras triplet.

(c) (5, 13, 13)

Now, $5^2 + 12^2 = 25 + 144$

$= 169$

$= 13^2$

Hence, this is a Pythagoras triplet.

(d) (21, 20, 28)

Now, $21^2 + 20^2 = 441 + 400$

$= 881$

$\neq 28^2$

Hence, this is not a Pythagoras triplet.

(iv). (b) 38 m

Since, AC = 50 m

Now, AB + BC = 50

=> AB + 12 = 50

=> AB = 50 – 12

=> AB = 38 m

(v). (c) 82 m

Length of rope used = AD + CD + BC

= 30 + 40 + 12

= 82 m

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