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Class: X
Subject: mathematics
Topic: Triangles
No. of Questions: 20
Duration: 60 Min
Maximum Marks: 60

Q1. In a triangle ABC, AB = 12, BC = 18, CA = 25 A semicircle is inscribed in ΔABC such that the diameter of the semicircle lies on $\overline{AC}$. If O is the center of the circle. What is the length of OA

A. 5 units

B. 7units

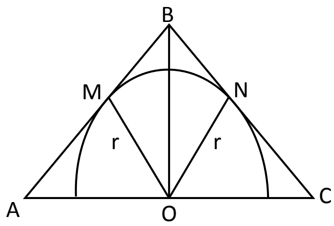
C. 10units

D. 15units

Sol C: Given AB = 12, BC = 18, AC = 25

We know that OM = ON = r

also we have



MN = NB(length of tangent)

$\therefore \Delta BMO \cong \Delta BNO$, $\therefore \angle ABO = \angle CBO$

$\Rightarrow$ OB in angle bisectors of $\angle B$.

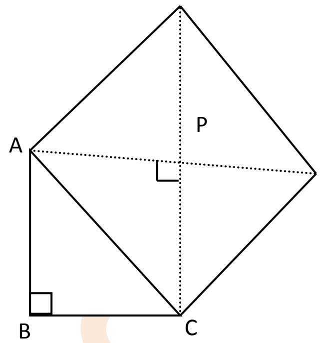
$\Rightarrow \frac{AB}{BC} = \frac{AO}{OC}$ (vertical angle bisector theorem)

Let OC = x $\Rightarrow$ OA = 25 – x

$\frac{12}{18} = \frac{25-x}{x}$ $\Rightarrow \frac{25}{x} = \frac{2}{3} + 1 = \frac{5}{3}$ $\Rightarrow x = \frac{25 \times 3}{5} = 15$ units

AO = 25– 15 = 10 units

Q2.ΔABC in a right angled at B. A square in constructed on AC on the side of AC opp. to B. 'P in the center of the square A. Which of the following is true



A. BP bisects ∠ABC.

B. BP does not bisect **∠ABC**

C. None of these

D. Nothing can be said for sure

Sol: A. Given ∠B = 90° and Angle at P = 90° since P.O.I of intersection of diagonals of a square.

∴A, B, C and P are con-cyclic points also AP = PC.

∴ ∠CBP = ∠ABP (angles subtended by equal chords at the circumference)

∴ BP bisects ∠ABC.

Q3.ΔABC is a right angled at A. AB = 60 AC = 80, BC = 100 units. D is a point between B and C such that the triangles ADB and ADC have equal perimeters, what is the length of AD

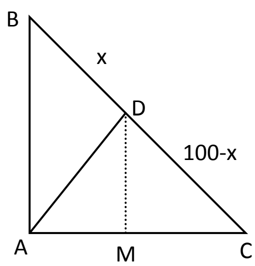
A. 34

B. $24\sqrt{5}$

C. 24

D. $34\sqrt{5}$

Sol: B B given perimeter of ABD = perimeter of ADC



60 + AD + x = 80 + AD + 100 – x

2x = 120, x = 60

∴BD = 60 and DC = 40

Draw perpendicular from D to AC at M

Now ΔABC ~ ΔDMC

$$\Rightarrow \frac{AB}{DM} = \frac{BC}{DC} \qquad \therefore \quad DM = \frac{AB.DC}{BC} = \frac{60.40}{100} = 24$$

From $\Delta DMC \Rightarrow (40)^2 = (24)^2 + (MC)^2$

$$\therefore MC = \sqrt{1600 - 576} = \sqrt{1024} \quad \Rightarrow MC = 32 \text{ units}$$

$\therefore AM = AC – MC = 80 – 32 = 48$ units

From ΔADM $AD^2 = AM^2 + DM^2$

$$= (24)^2 + (48)^2 = 576 + 2304 = 2880 \qquad \therefore \quad AD = 24\sqrt{5}$$

Q4. The sides of a right angled triangle, have length which are integers in arithmetic progression. There exists such triangle with smallest side having length of

A 2000 units B 2001 units C 2002 units D 2003 units

Sol B: Let 3x, 4x and 5x be the sides of the right angle triangle which are in AP.

If $x \in N$ then they are integers out of these sides 3x in the least side and out of the given options 2001 in only the multiple of '3'.

$\therefore$ There exists a triangle (right) with sides are integers and they are in AP with least side 2001 units.

Q5. ΔABC has integral side AB, BC measuring 2001 units and 1002 units respectively. Find the number of such triangles.

A. 2001

B. 2002

C. 2003

D. 2004

Sol C: Given AB = 2001, BC = 1002 units

CA < AB + BC

And CA > AB – BC $\therefore$ 999 < CA < 3003

And $CA \in N$ CA = {1000, 1001 …3002}

$\therefore$ There are 2003 such triangles.

Q6. ABCD in a cyclic quadrilateral BD bisects AC. AB = 10, AD = 12, DC = 11. Determine BC.

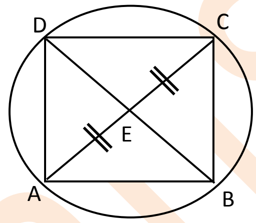
A. 12

B. 11

C. 120/11

D. 100/9

Sol C: From ΔABE and ΔDEC



$\angle DEC = \angle AEB$

$\angle B = \angle C$ (Angles made by AD)

$\therefore \angle D = \angle A$

$\therefore\ \Delta ABE \sim \Delta DEC$ ………….(1)

Similarly we can prove for ΔADE and ΔBEC.

$\therefore \Delta AED \sim \Delta BEC$………….(2)

$\frac{DC}{AB} = \frac{DE}{AE}$ by ………(1)

$\frac{AD}{CB} = \frac{DE}{CE}$ by ………(2)

But given AE = CE

$\Rightarrow \frac{DC}{AB} = \frac{AD}{BC}$ $\therefore\ BC = \frac{12.10}{11} = \frac{120}{11}$

Q7. In ΔABC, DE II BC intersecting AB at D and AC at E, AD = 1cm, DB = 3cm, AE = 1.5cm, AC =?

(A) 8 cm
(B) 10cm
(C) 6 cm
(D) None of these

Sol C:

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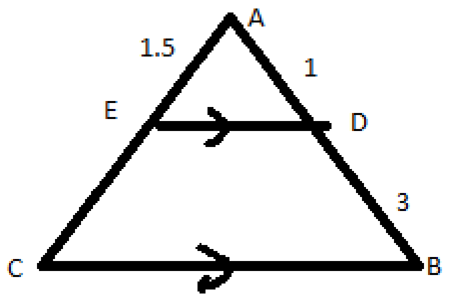


Using similarity

$\frac{AE}{EC} = \frac{AD}{DB}$

Ec= $\frac{1.5X3}{1}$ = 4.5

Ac = Ae + Ec = 6

Q8. In ΔABC, D is a point on AB and E is a point on AC, DE is joined. AD = 2, DB = 3, AE = 3 cm, EC = 4.5. Which of the following is not true?

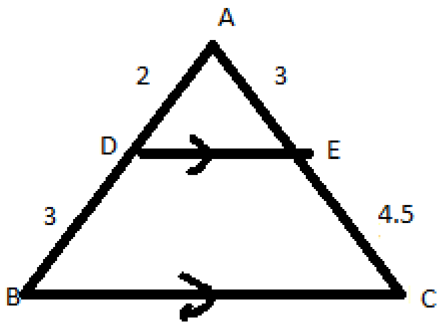
A. DE is not parallel to BC

B. BE is parallel to BC

C. AD/DB =AE/EC

D. B and C

Sol A:



$\frac{AD}{DB} = \frac{2}{3}$

$\frac{AE}{EC} = \frac{3}{4.5} = \frac{1}{1.5} = \frac{2}{3}$

$\Rightarrow \frac{AD}{DB} = \frac{AE}{EC} \Rightarrow$ DE 11 BC

Q9. The lengths of the diagonals of a rhombus are 16 cm and 12 cm. Then, the length of the side of the rhombus is

(A) 9cm
(B) 10cm
(C) 8cm
(D) 20cm

Sol (B): Use Pythagoras theorem

Q10. In triangles ABC and DEF, ∠B=∠E, ∠F= ∠C and AB = 3 DE Then, the two triangles are

(A) Congruent but not similar
(B) Similar but not congruent
(C) Neither congruent nor similar
(D) Congruent as well as similar

Sol (B): by AAA criteria similar but not congruent as sides are not equal

Q.11 the perimeters of two similar triangles ABC and PQR are respectively 36cm and 48cm. If PQ =12cm, then AB=

(A) 16 cm

(B) 20 cm

(C) 25 cm

(C) 9 cm

Sol(D): Ratio of perimeters = Ratio of sides

$\frac{36}{48} = \frac{AB}{F8} = \frac{AB}{12}$

AB= 9 cm

Q.12 In a Δ ABC, AD is the bisector of ∠BAC. If AB = 12 cm, AC = 10cm and BD = 6cm, then DC =

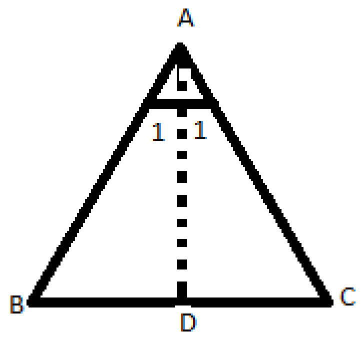
(A) 22.3cm

(B) 5cm

(C) 7cm

(D) 9cm

Sol(B):



AB=12

AC=10

BD=6an

Using propesty of bisector

$\frac{AB}{DB} = \frac{AC}{CD}$

CD= $\frac{10X6}{12}$ = 5 cm

Q.13 which is a False Statement?

(A) All quadrilateral triangles are not similar.

(B) All circles are similar.

(C) None of these

(D) All 30^0. 60^0. 90^0 triangles are similar.

Sol (A):

In care of square all △ ‘s are similar statement is true for some quadrilat erals.

Q.14 Two isosceles triangles have equal vertical angles and their areas are in the ratio 16: 25. Then the ratios of their corresponding heights are

(A) 16:25

(B) 256:625

(C) 4:5

(D) 5:4

Sol(C):

Ratio of area α $\frac{16}{25} = \left(\frac{h1}{h2}\right)^2$

$\frac{h1}{h2} = \frac{4}{5}$

Q.15 if Δ ABC ~ Δ EDF and Δ ABC is not similar to Δ DEF, then which of the following is not true?

(A) BC.EF =AC.FD

(B) AB.EF=AC.DE

(C) BC.DE=AB.EF

(D) BC.DE=AB.FD

Sol(C):

Δ ABC ∽ Δ EDF

$\frac{AB}{ED} = \frac{BC}{DF} = \frac{AC}{EF}$

a is true

b is true

c is false

d is again true

hence c is the answer

Q.16 Sides of two similar triangles are in the ratio of 4:9. Areas of these triangles are in the ratio.

(A) 2:3

(B) 4:9

(C) 81:16

(D) 16:81

Sol(D)

Ratio hrea α $(\text{Side})^2$ (For similar triangles)

Q.17 Two triangles are similar but not congruent and the lengths of the sides of the first are 6cm, 11 and 12cm. The ratio of corresponding sides of first and second triangle is 1:2 What is the perimeter of the second tringle:

(A) 29cm

(B) 53cm

(C) 58cm

(D) 56cm

Sol(C):

Sides of 2^{nd} triangle 12,22,24 perimeters 58

Q.18 In an isosceles triangle ABC, If AC = BC and $AB^2 = 2\ AC^2$, then ∠C=

(A) 45^0

(B) 60^0

(C) 90^0

(D) 30^0

Sol(C):

This is isosceles right triangle

Ac=BC

⇒AB is hypotenuse

L opp to hypotenuse is $C=90^o$

Q19.

If three sides of a triangle area, $a\sqrt{3}$, and $a\sqrt{2}$, then the measure of the angle opposite the longest side is

(a) 60^o
(b) 90^o
(c) 75^o
(d) 120^o

Sol(B)

It's a right angled triangle.

Q20. ABC and BDE are two equilateral triangles such that D is the midpoint of BC. Ratio of the areas of triangles ABC and BDE is

(a) 2:1
(b) 1:2
(c) 4:1
(d) Cannot be determined

Sol(C):

Side is half so area of small triangle will be ¼ of bigger triangle.