

# SIMILARITY & CONGRUENCY

समरूपता तथा सर्वांगसमता

## PRACTICE SHEET

WITH SOLUTIONS

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 Rankers Gurukul

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# Similarity & Congruency/समरूपता और सर्वांगसमता

## (Practice Sheet With Solution)

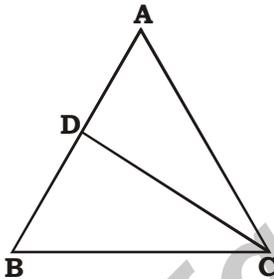
1. The sides of similar triangle  $\Delta PQR$  and  $\Delta DEF$  are in the ratio 5 : 6. If area of  $\Delta PQR$  is equal to  $75 \text{ cm}^2$ , what is the area of  $\Delta DEF$ ?

समरूप त्रिभुज  $\Delta PQR$  और  $\Delta DEF$  की भुजाओं का अनुपात 5 : 6 है। यदि  $\Delta PQR$  का क्षेत्रफल  $75 \text{ सेमी}^2$  के बराबर है, तो  $\Delta DEF$  का क्षेत्रफल क्या है?

- (a)  $150 \text{ cm}^2$  (b)  $90 \text{ cm}^2$   
(c)  $108 \text{ cm}^2$  (d)  $120 \text{ cm}^2$

2. In the figure,  $\angle BAC = \angle BCD$ ,  $AB = 32 \text{ cm}$  and  $BD = 18 \text{ cm}$  then find the length of side  $BC$ .

दिए गए आकृति में,  $\angle BAC = \angle BCD$ ,  $AB = 32$  सेमी और  $BD = 18$  सेमी है तो भुजा  $BC$  की लंबाई ज्ञात कीजिए।



- (a)  $20 \text{ cm}$  (b)  $24 \text{ cm}$   
(c)  $30 \text{ cm}$  (d)  $28 \text{ cm}$

3. In  $\Delta ABC$ ,  $DE \parallel AB$ , where  $D$  and  $E$  are the points on sides  $AC$  and  $BC$ , respectively. If  $AD = x - 3$ ,  $AC = 2x$ ,  $BE = x - 2$  and  $BC = 2x + 3$ , then what is the value of  $x$ ?

$\Delta ABC$  में,  $DE \parallel AB$  है, जहाँ  $D$  और  $E$  क्रमशः भुजाओं  $AC$  और  $BC$  पर बिंदु हैं। यदि  $AD = x - 3$ ,  $AC = 2x$ ,  $BE = x - 2$  तथा  $BC = 2x + 3$  हैं, तो  $x$  का मान ज्ञात करें।

- (a) 12 (b) 10  
(c) 8 (d) 9

4. In  $\Delta ABC$ ,  $\angle C = 90^\circ$  and  $CD$  is perpendicular to  $AB$  where  $D$  is point on  $AB$ . If  $\frac{AD}{BD} = \sqrt{k}$ , then

$$\frac{AC}{BC} = ?$$

$\Delta ABC$  में,  $\angle C = 90^\circ$  और  $CD$ , भुजा  $AB$  पर लंब है जहाँ

$D$ ,  $AB$  पर एक बिंदु है। यदि  $\frac{AD}{BD} = \sqrt{k}$  है, तो  $\frac{AC}{BC} = ?$

- (a)  $k$  (b)  $\sqrt{k}$   
(c)  $\frac{1}{\sqrt{k}}$  (d)  $\sqrt[4]{k}$

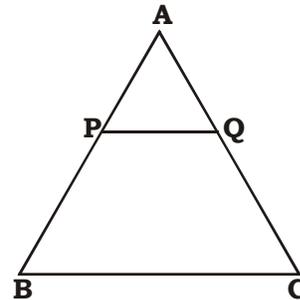
5. A triangle  $PQR$  is right angled at  $Q$ , where,  $E$  and  $F$  are mid points of  $QR$  and  $PQ$ , respectively. What will be the ratio of the area of the quadrilateral  $PREF$  to the area of triangle  $PQR$ .

एक त्रिभुज  $PQR$ ,  $Q$  पर समकोण है, जहाँ,  $E$  और  $F$  क्रमशः  $QR$  और  $PQ$  के मध्य बिंदु हैं। चतुर्भुज  $PREF$  के क्षेत्रफल का त्रिभुज  $PQR$  के क्षेत्रफल से अनुपात क्या होगा?

- (a) 2 : 3 (b) 3 : 4  
(c) 3 : 2 (d) 4 : 3

6. In a triangle  $ABC$ ,  $P$  and  $Q$  are points on  $AB$  and  $AC$  respectively, such that  $AP = 1 \text{ cm}$ ,  $PB = 3 \text{ cm}$ ,  $AQ = 1.5 \text{ cm}$ , and  $CQ = 4.5 \text{ cm}$ . If the area of  $\Delta APQ$  is  $12 \text{ cm}^2$ , then find the area of  $BPQC$ .

त्रिभुज  $ABC$  में,  $P$  और  $Q$  क्रमशः  $AB$  और  $AC$  पर स्थित ऐसे बिंदु हैं कि  $AP = 1$  सेमी,  $PB = 3$  सेमी,  $AQ = 1.5$  सेमी, तथा  $CQ = 4.5$  सेमी, यदि  $\Delta APQ$  का क्षेत्रफल  $12$  सेमी<sup>2</sup> है, तो  $BPQC$  का क्षेत्रफल ज्ञात कीजिए।



- (a)  $192 \text{ cm}^2$  (b)  $180 \text{ cm}^2$   
(c)  $190 \text{ cm}^2$  (d)  $182 \text{ cm}^2$

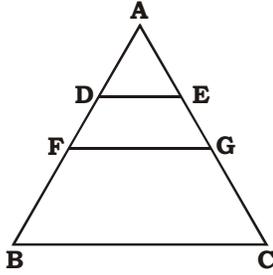
7. In  $\Delta ABC$ ,  $DE \parallel AB$ , where  $D$  and  $E$  are points on sides  $AC$  and  $BC$ , respectively.  $F$  is a point between  $C$  and  $D$  such that  $EF \parallel BD$ . If  $AD = 15 \text{ cm}$ ,  $DC = 10 \text{ cm}$ , then the length of  $CF$  is:

$\Delta ABC$  में,  $DE \parallel AB$  है, जहाँ  $D$  और  $E$  क्रमशः भुजा  $AC$  और  $BC$  पर स्थित बिंदु हैं।  $C$  और  $D$  के बीच बिंदु  $F$  इस प्रकार है कि  $EF \parallel BD$  है। यदि  $AD = 15$  सेमी,  $DC = 10$  सेमी है, तो  $CF$  की लंबाई ज्ञात करें।

- (a)  $3 \text{ cm}$  (b)  $7.5 \text{ cm}$   
(c)  $5 \text{ cm}$  (d)  $4 \text{ cm}$

8. In the triangle given below,  $D$  and  $E$  are mid points of  $AF$  and  $AG$  respectively.  $F$  and  $G$  are mid points of  $AB$  and  $AC$  respectively. If  $DE = 2.4 \text{ cm}$ , then  $BC$  is equal to:

नीचे दिए गए त्रिभुज में, D और E क्रमशः AF और AG के मध्य बिंदु हैं, F और G क्रमशः AB और AC के मध्य बिंदु हैं। यदि DE = 2.4 सेमी. है तो BC का मान क्या है?



- (a) 4.8 cm (b) 3.6 cm  
(c) 9.6 cm (d) 7.2 cm

9. In  $\triangle ABC$ ,  $AB = AC$  and  $AL$  is perpendicular to  $BC$  at  $L$ . In  $\triangle DEF$ ,  $DE = DF$  and  $DM$  is perpendicular to  $EF$  at  $M$ . If (area of  $\triangle ABC$ ) : (area of  $\triangle DEF$ ) = 9 : 25, then  $\frac{DM + AL}{DM - AL}$  is equal to:

$\triangle ABC$  में,  $AB = AC$  और  $AL$ ,  $BC$  के बिंदु  $L$  पर लंब है।  $\triangle DEF$  में,  $DE = DF$  और  $DM$ ,  $EF$  के बिंदु  $M$  पर लंब है। यदि  $(\triangle ABC$  का क्षेत्रफल) :  $(\triangle DEF$  का क्षेत्रफल) = 9 : 25

है, तो  $\frac{DM + AL}{DM - AL}$  का मान ज्ञात करें।

- (a) 6 (b) 4  
(c) 3 (d) 5

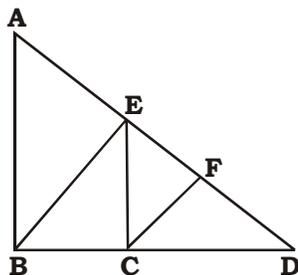
10. In  $\triangle ACE$ ,  $B$  and  $D$  are the points on side  $AC$  and  $CE$  respectively, such that  $BD \parallel AE$ .  $AE = \frac{8}{3} BD$ . What is the ratio of the area of  $\triangle BDC$  to that of  $\triangle AEC$ ?

$\triangle ACE$  में,  $B$  और  $D$  क्रमशः भुजा  $AC$  और  $CE$  पर इस प्रकार बिंदु हैं कि  $BD \parallel AE$  है।  $AE = \frac{8}{3} BD$  है।  $\triangle BDC$  तथा  $\triangle AEC$  के क्षेत्रफलों में क्या अनुपात है?

- (a) 9 : 64 (b) 3 : 8  
(c) 8 : 11 (d) 9 : 16

11. In the given figure,  $AB \parallel CE$  and  $BE \parallel CF$ . If the ratio of  $BC : DC = 5 : 4$ , then find ratio  $AE : EF : FD$ .

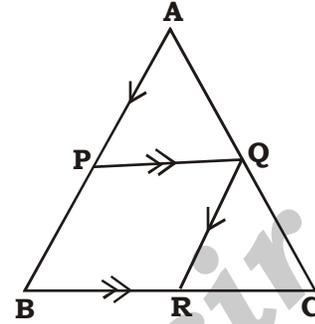
दी गई आकृति में,  $AB \parallel CE$  और  $BE \parallel CF$  है। यदि  $BC : DC = 5 : 4$  का अनुपात है, तो  $AE : EF : FD$  का अनुपात ज्ञात कीजिए।



- (a) 45 : 20 : 16 (b) 16 : 20 : 45  
(c) 45 : 10 : 15 (d) 45 : 16 : 20

12. In the given figure,  $PQ \parallel BR$  &  $AP \parallel QR$  &  $AP : PB = 3 : 7$ , then find  $BR : RC$ .

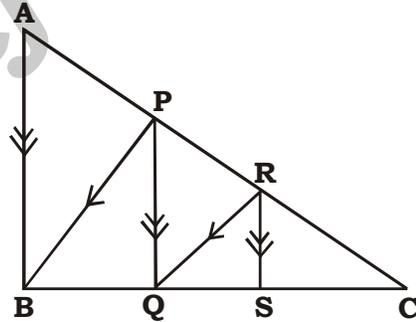
दी गई आकृति में,  $PQ \parallel BR$  और  $AP \parallel QR$  और  $AP : PB = 3 : 7$  है तो  $BR : RC$  ज्ञात कीजिए।



- (a) 3 : 5 (b) 3 : 7  
(c) 7 : 3 (d) 3 : 5

13. In the given figure,  $\frac{AP}{PR} = \frac{7}{3}$ , then find  $AP : PC$ .

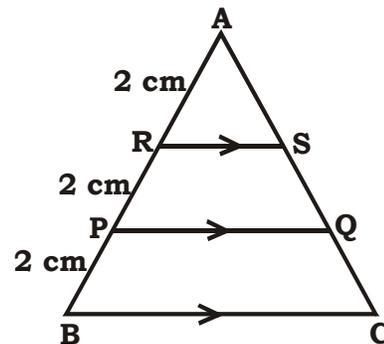
दी गई आकृति में,  $\frac{AP}{PR} = \frac{7}{3}$  है, तो  $AP : PC$  ज्ञात कीजिए।



- (a) 5 : 4 (b) 4 : 3  
(c) 8 : 3 (d) 6 : 5

14.  $ABC$  is an equilateral triangle, find the perimeter of quadrilateral  $RSQP$ .

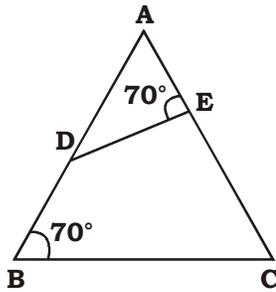
$ABC$  एक समबाहु त्रिभुज है, चतुर्भुज  $RSQP$  का परिमाण ज्ञात कीजिए।



- (a) 12 cm (b) 10 cm  
(c) 11 cm (d) 9 cm

15. In the given figure,  $AD = 12$  cm,  $AE = 8$  cm and  $EC = 14$  cm, then what is the value (in cm) of  $BD$ ?

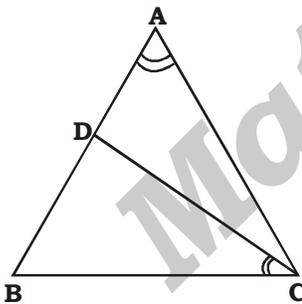
दी गई आकृति में, यदि  $AD = 12$  सेमी,  $AE = 8$  सेमी  $EC = 14$  सेमी है, तो  $BD$  का मान (सेमी में) क्या है?



- (a)  $\frac{50}{3}$  (b) 15  
(c)  $\frac{8}{3}$  (d)  $\frac{44}{3}$

16. In the given figure,  $\angle BAC = \angle BCD$ ,  $AB = 50$  cm and  $BD = 18$  cm, then find the ratio of perimeter of  $\triangle ABC$  and  $\triangle BCD$ ?

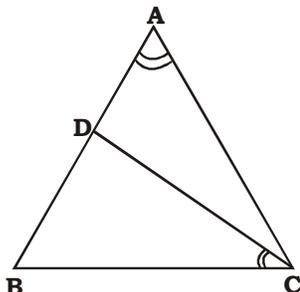
दिए गए चित्र में,  $\angle BAC = \angle BCD$ ,  $AB = 50$  cm और  $BD = 18$  cm है। तब त्रिभुज  $ABC$  और त्रिभुज  $BCD$  के परिमापों का अनुपात ज्ञात करें।



- (a)  $\frac{25}{9}$  (b)  $\frac{5}{3}$   
(c)  $\frac{5}{4}$  (d)  $\frac{20}{9}$

17. In the given figure,  $\angle BAC = \angle BCD$ ,  $BD = 18$  cm,  $CD = 12$  cm,  $BC = 24$  cm then find the ratio of perimeter of  $\triangle ADC$  and perimeter of  $\triangle BCD$ .

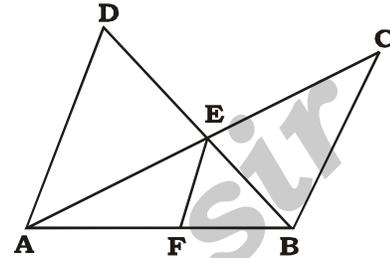
दिए गए चित्र में,  $\angle BAC = \angle BCD$  और  $BD = 18$  सेमी,  $CD = 12$  सेमी,  $BC = 24$  सेमी है तब त्रिभुज  $ADC$  और त्रिभुज  $BCD$  के परिमाप का अनुपात ज्ञात करें।



- (a)  $\frac{7}{9}$  (b)  $\frac{6}{7}$   
(c)  $\frac{13}{18}$  (d)  $\frac{2}{3}$

18. In the given figure,  $AD \parallel FE \parallel BC$ , if  $AD = 8$  unit and  $BC = 12$  unit, then find  $FE$ .

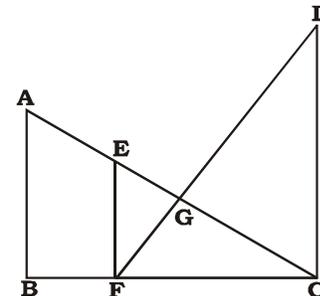
दी गई आकृति में  $AD \parallel FE \parallel BC$  है, यदि  $AD = 8$  इकाई और  $BC = 12$  इकाई है, तो  $FE$  ज्ञात कीजिए।



- (a) 4.8 (b) 10  
(c) 6 (d) 5.6

19. In the given figure,  $AB$ ,  $EF$  and  $CD$  are parallel lines, given that  $EG = 5$  cm,  $GC = 10$  cm and  $DC = 18$  cm. Calculate  $AC$ , if  $AB = 15$  cm.

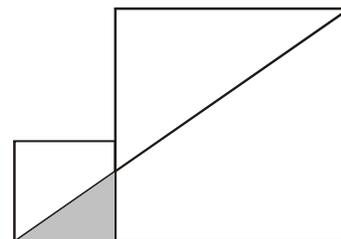
दिए गए चित्र में  $AB$ ,  $EF$  और  $CD$  समानांतर रेखाएँ हैं, जिसमें  $EG = 5$  cm,  $GC = 10$  cm और  $DC = 18$  cm है।  $AC$  की गणना करें, यदि  $AB = 15$  सेमी है।



- (a) 21 cm (b) 25 cm  
(c) 30 cm (d) 28 cm

20. In the given figure, two squares of sides 8 cm and 20 cm are given. What is the area (in  $cm^2$ ) of the shaded part?

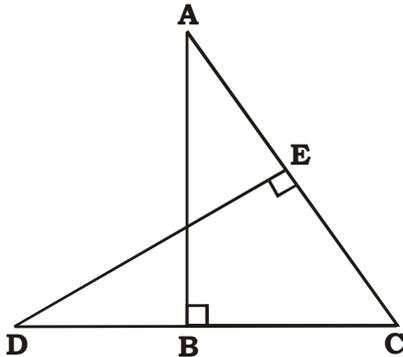
दिए गए चित्र में, दो वर्ग जिनकी भुजायें 8 सेमी और 20 सेमी दी गई हैं। छायांकित भाग का क्षेत्रफल क्या होगा?



- (a)  $\frac{120}{7}$  (b)  $\frac{160}{7}$   
 (c)  $\frac{180}{7}$  (d)  $\frac{240}{13}$

21. In the given figure,  $BC = 5.4$ ,  $CE = 9$ ,  $AC = 4x - 1$ ,  $CD = 5x + 3$  then  $x$  is-

दी गई आकृति में,  $BC = 5.4$ ,  $CE = 9$ ,  $AC = 4x - 1$ ,  $CD = 5x + 3$  तब  $x$  का मान होगा-



- (a) 2 (b) 2.5  
 (c) 2.8 (d) 3.4
22. In trapezium ABCD,  $AB \parallel CD$  and  $AB = 2 CD$ . Its diagonals intersect at O. If the area of  $\Delta AOB = 84 \text{ cm}^2$ , then the area of  $\Delta COD$  is equal to

एक समलंब ABCD में,  $AB \parallel CD$  है और  $AB = 2CD$  है। इसके विकर्ण O पर एक-दूसरे को काटते हैं। यदि  $\Delta AOB$  का क्षेत्रफल 84 सेमी<sup>2</sup> है, तो  $\Delta COD$  के क्षेत्रफल का मान किसके बराबर है?

- (a)  $21 \text{ cm}^2$  (b)  $42 \text{ cm}^2$   
 (c)  $72 \text{ cm}^2$  (d)  $26 \text{ cm}^2$
23. ABCD is a trapezium with AD and BC parallel sides. E is a point on BC. Find the ratio of the areas of trapezium ABCD to area of  $\Delta AED$ .

ABCD एक समलम्ब चतुर्भुज है जिसमें  $AD \parallel BC$  है। भुजा BC पर कोई बिन्दु E है तो (ABCD) समलम्ब का क्षेत्रफल : ( $\Delta AED$ ) का क्षेत्रफल बताओ।

- (a)  $\frac{AD}{BC}$  (b)  $\frac{BE}{EC}$   
 (c)  $\frac{AD + BC}{BC + CE}$  (d)  $\frac{AD + BC}{AD}$

24. If in  $\Delta ABC$  and  $\Delta DEF$ ,  $\angle A = 50^\circ$ ,  $\angle B = 70^\circ$ ,  $\angle C = 60^\circ$ ,  $\angle E = 70^\circ$  and  $\angle F = 50^\circ$ , which of the following is correct?

यदि  $\Delta ABC$  और  $\Delta DEF$  में,  $\angle A = 50^\circ$ ,  $\angle B = 70^\circ$ ,  $\angle C = 60^\circ$ ,  $\angle E = 70^\circ$  और  $\angle F = 50^\circ$ , तो निम्नलिखित में से कौन सा सही है?

- (a)  $\Delta ABC \sim \Delta DEF$  (b)  $\Delta ABC \sim \Delta EDF$   
 (c)  $\Delta ABC \sim \Delta DFE$  (d)  $\Delta ABC \sim \Delta FED$

25. If in a  $\Delta ABC$ ,  $a = 18$ ,  $b = 24$  and  $c = 30$ , then find the value of  $\cos A$ .

यदि  $\Delta ABC$  में,  $a = 18$ ,  $b = 24$  और  $c = 30$  है, तो  $\cos A$  का मान ज्ञात कीजिए।

- (a)  $\frac{4}{3}$  (b)  $\frac{3}{5}$   
 (c)  $\frac{4}{5}$  (d) None of these

26. In a  $\Delta ABC$ ,  $(c + a + b)(a + b - c) = ab$ . The measure of the angle C is:

$\Delta ABC$  में,  $(c + a + b)(a + b - c) = ab$  है, तो कोण C का माप है:

- (a)  $\frac{\pi}{3}$  (b)  $\frac{\pi}{6}$   
 (c)  $\frac{\pi}{3}$  (d) None of these

27. The angle between the two sides of the triangle having length 6 cm and 8 cm is  $60^\circ$ , find the third side of the triangle.

6 सेमी और 8 सेमी लंबाई वाले त्रिभुज की दोनों भुजाओं के बीच का कोण  $60^\circ$  है, त्रिभुज की तीसरी भुजा ज्ञात कीजिए।

- (a)  $\sqrt{26} \text{ cm}$  (b) 12 cm  
 (c)  $\sqrt{52} \text{ cm}$  (d) 13 cm

28. In a triangle ABC,  $a = 4$ ,  $b = 3$ ,  $\angle BAC = 60^\circ$ , then the equation for which c is the root, is

एक त्रिभुज ABC में,  $a = 4$ ,  $b = 3$ ,  $\angle BAC = 60^\circ$ , तो वह समीकरण जिसका मूल C है,

- (a)  $c^2 + 3c + 7 = 0$  (b)  $c^2 + 3c - 7 = 0$   
 (c)  $c^2 - 3c + 7 = 0$  (d)  $c^2 - 3c - 7 = 0$

29. If the angles of triangle ABC are in AP and  $b : a = \sqrt{3} : 1$ , then what is the value of A?

यदि त्रिभुज ABC के कोण AP में हैं और  $b : a = \sqrt{3} : 1$  है, तो A का मान क्या है?

- (a)  $30^\circ$  (b)  $45^\circ$   
 (c)  $60^\circ$  (d)  $90^\circ$

30. In a triangle ABC, side  $c = 2$ , angle  $A = 45^\circ$ , side  $a = 2\sqrt{2}$ , then what is angle C equal to?

त्रिभुज ABC में, भुजा  $c = 2$ , कोण  $A = 45^\circ$ , भुजा  $a = 2\sqrt{2}$  है, तो कोण C किसके बराबर है?

- (a)  $30^\circ$  (b)  $15^\circ$   
 (c)  $45^\circ$  (d) None of the above

31. In a triangle ABC,  $a = (1 + \sqrt{3}) \text{ cm}$ ,  $b = 2 \text{ cm}$  and angle  $C = 60^\circ$ , then the other two angles are

एक त्रिभुज ABC में,  $a = (1 + \sqrt{3})$  सेमी,  $b = 2$  सेमी और कोण  $C = 60^\circ$  है, तो अन्य दो कोण हैं-

- (a)  $45^\circ$  and  $75^\circ$   
 (b)  $30^\circ$  and  $90^\circ$   
 (c)  $105^\circ$  and  $15^\circ$   
 (d)  $100^\circ$  and  $20^\circ$

32. In any  $\triangle ABC$ ,  $\angle C = 75^\circ$ ,  $\angle B = 45^\circ$  and  $a = \sqrt{3}$ , then find the value of b.

किसी  $\triangle ABC$  में,  $\angle C = 75^\circ$ ,  $\angle B = 45^\circ$  और  $a = \sqrt{3}$  है, तो b का मान ज्ञात कीजिए।

- (a) 1 (b)  $\sqrt{2}$   
 (c)  $2\sqrt{2}$  (d)  $2\sqrt{3}$

33. In  $\triangle ABC$ , AB, BC and AC are equal to 5 cm, 12 cm and 9 cm respectively. If the median AD intersects the opposite side BC at D, find the measure of median AD.

$\triangle ABC$  में, AB, BC और AC क्रमशः 5 सेमी, 12 सेमी और 9 सेमी के बराबर हैं। यदि माध्यिका AD विपरीत भुजा BC को D पर प्रतिच्छेद करती है, तो माध्यिका AD का माप ज्ञात कीजिए।

- (a)  $\sqrt{8.5}$  cm (b)  $\sqrt{17}$  cm  
 (c) 5 cm (d)  $\sqrt{34}$  cm

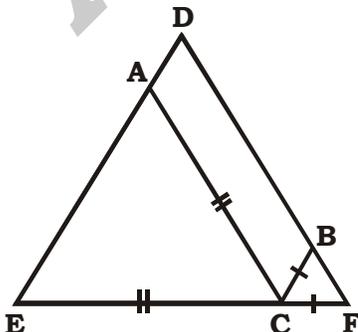
34. In  $\triangle ABC$ ,  $AB = AC$  and D is a point on BC. If  $BD = 5$  cm,  $AB = 12$  cm and  $AD = 8$  cm then the length of CD is:

$\triangle ABC$  में,  $AB = AC$  और D, BC पर एक बिंदु है। यदि  $BD = 5$  सेमी,  $AB = 12$  सेमी और  $AD = 8$  सेमी है तो CD की लंबाई है:

- (a) 14.8 cm (b) 16.2 cm  
 (c) 16 cm (d) 14 cm

35. In triangle DEF shown below, points A, B and C are taken on DE, DF and EF respectively such that  $EC = AC$  and  $BC = CF$ . If angle D equals 40 degrees, then angle ACB is-

नीचे दिखाए गए त्रिभुज DEF में, बिंदु A, B और C को क्रमशः DE, DF और EF पर इस प्रकार लिया गया है कि  $EC = AC$  और  $BC = CF$  है। यदि कोण D, 40 डिग्री के बराबर है, तो कोण ACB क्या है?



- (a) 140 (b) 70  
 (c) 100 (d) None of these

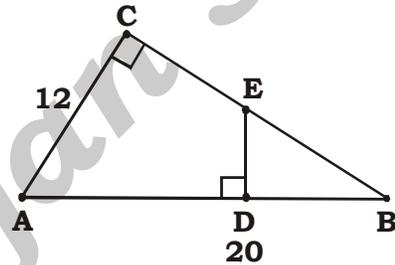
36. Find the area of the triangle whose vertices are (a,a) (a + 1, a + 1) and (a + 2, a).

उस त्रिभुज का क्षेत्रफल ज्ञात कीजिए जिसके शीर्ष (a,a) (a + 1, a + 1) और (a + 2, a) हैं।

- (a)  $a^3$  (b) 1  
 (c) 2a (d)  $2\frac{1}{2}$

37. In the given right angled triangle ABC,  $AD = DB$ , DE is perpendicular to AB,  $AB = 20$  and  $AC = 12$ , find the area of the quadrilateral ADEC.

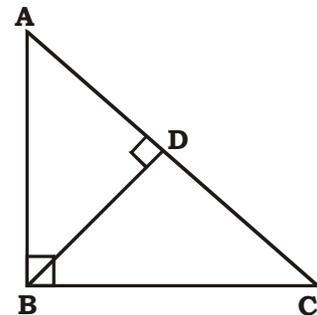
दिए गए समकोण त्रिभुज ABC में,  $AD = DB$ , DE, AB पर लंबवत है,  $AB = 20$  और  $AC = 12$  है, चतुर्भुज ADEC का क्षेत्रफल ज्ञात कीजिए।



- (a) 58.5 (b) 56  
 (c) 45 (d) 37.5

38. In the given figure,  $AB = 8$  cm,  $AC = 17$  cm. What is the length of AD?

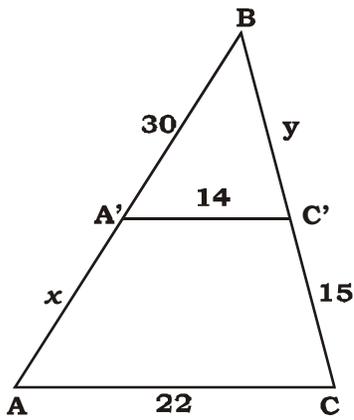
दी गई आकृति में  $AB = 8$  cm,  $AC = 17$  cm. AD की लंबाई कितनी है?



- (a) 4.68 cm  
 (b) 5.36 cm  
 (c) 3.76 cm  
 (d) 8.5 cm

39. In the triangle ABC shown below,  $A'C'$  is parallel to AC. Find the length y of  $BC'$  and the length x of  $A'A$ .

नीचे दिखाए गए त्रिभुज ABC में,  $A'C'$  AC के समानांतर है।  $BC'$  की लंबाई y और  $A'A$  की लंबाई x ज्ञात कीजिए।



(a)  $x = \frac{120}{7}, y = \frac{105}{4}$

(b)  $x = 15, y = 10$

(c)  $x = 10, y = 15$

(d)  $x = 12, y = 15$

40. A girl looks the reflection of the top of the lamp post on the mirror which is 6.6 m away from the foot of the lamppost. The girl whose height is 1.25 m is standing 2.5 m away from the mirror. Assuming the mirror is placed on the ground facing the sky and the girl, mirror and the lamppost are in a same line, find the height of the lamp post.

एक लड़की लैंप पोस्ट के शीर्ष का प्रतिबिंब दर्पण पर देखती है जो लैंप पोस्ट के निचले भाग से 6.6 मीटर दूर है। वह लड़की जिसकी ऊंचाई 1.25 मीटर है वह दर्पण से 2.5 मीटर दूर खड़ी है। यह मानते हुए कि दर्पण जमीन पर आकाश की ओर रखा गया है और लड़की, दर्पण और लैंपपोस्ट एक ही पंक्ति में हैं, लैंप पोस्ट की ऊंचाई ज्ञात करें।

(a) 2

(b) 3

(c) 3.3

(d) 4.3

### Answer Key

1.(c)	2.(b)	3.(d)	4.(d)	5.(b)	6.(b)	7.(d)	8.(c)	9.(b)	10.(a)
11.(a)	12.(b)	13.(b)	14.(b)	15.(c)	16.(b)	17.(a)	18.(a)	19.(b)	20.(b)
21.(c)	22.(a)	23.(d)	24.(d)	25.(c)	26.(d)	27.(c)	28.(d)	29.(a)	30.(a)
31.(a)	32.(b)	33.(b)	34.(c)	35.(c)	36.(b)	37.(a)	38.(c)	39.(a)	40.(c)

# SOLUTIONS

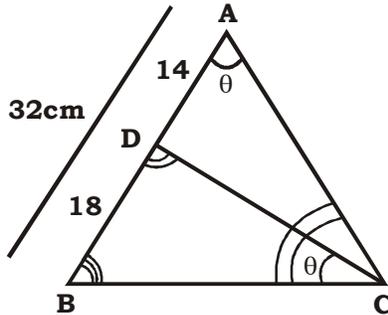
1. (c)  $\Delta PQR \sim \Delta DEF$

$$\therefore \frac{\text{Area of } \Delta PQR}{\text{Area of } \Delta DEF} = \frac{(\text{side of } \Delta PQR)^2}{(\text{side of } \Delta DEF)^2}$$

$$\Rightarrow \frac{75}{\text{Area of } \Delta DEF} = \frac{(5x)^2}{(6x)^2} = \frac{25x^2}{36x^2}$$

$$\Rightarrow \text{Area of } \Delta DEF = 36 \times 3 = 108 \text{ cm}^2$$

2. (b)



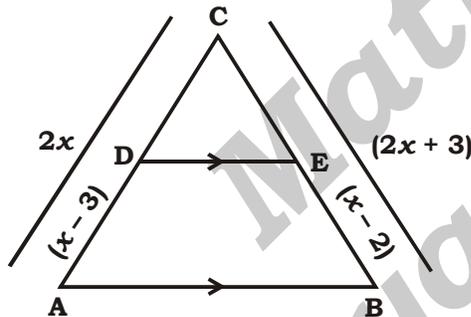
$\therefore \Delta BAC \sim \Delta BCD$

$$\therefore \frac{BC}{BD} = \frac{AB}{BC}$$

$$\Rightarrow BC^2 = AB \times BD = 32 \times 18 = 64 \times 9$$

$$\Rightarrow BC = 8 \times 3 = 24 \text{ cm}$$

3. (d)



$\therefore DE \parallel AB$   
 $\therefore \Delta ACB \sim \Delta DCE$

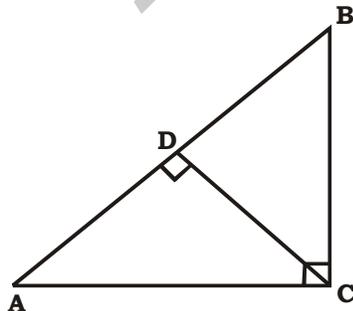
$$\Rightarrow \frac{AC}{AD} = \frac{BC}{BE}$$

$$\Rightarrow \frac{2x}{x-3} = \frac{(2x+3)}{x-2}$$

$$\Rightarrow 2x^2 - 4x = 2x^2 - 6x + 3x - 9$$

$$\Rightarrow -x = -9 \Rightarrow x = 9$$

4. (d)



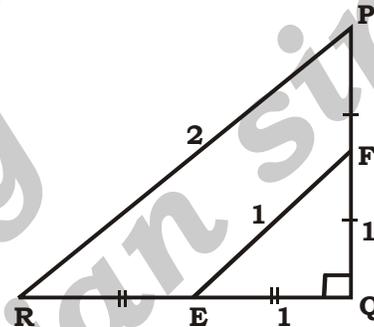
$\therefore ABC$  is a right angle triangle and  $CD \perp AB$ ,

$$\therefore \frac{AD}{BD} = \left(\frac{AC}{BC}\right)^2$$

$$\Rightarrow \sqrt{k} = \left(\frac{AC}{BC}\right)^2$$

$$\Rightarrow \frac{AC}{BC} = (k)^{\frac{1}{4}} = \sqrt[4]{k}$$

5. (b)



By Midpoint theorem,  $FE : PR = 1 : 2$

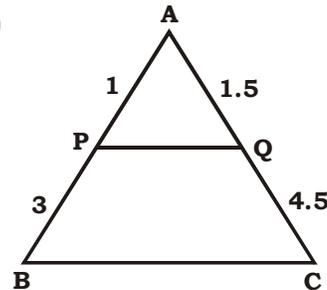
$\therefore \Delta FQE \sim \Delta PQR$

$$\therefore \frac{\text{ar} \Delta FQE}{\text{ar} \Delta PQR} = \left(\frac{EF}{PR}\right)^2 = \frac{1}{4}$$

$\therefore$  Area of quadrilateral PFEQ =  $4 - 1 = 3 \text{ unit}^2$

$\therefore$  Ratio =  $3 : 4$

6. (b)



$$\frac{AP}{AB} = \frac{1}{4} \dots\dots(i)$$

$$\frac{AQ}{AC} = \frac{1.5}{6} = \frac{1}{4} \dots\dots(ii)$$

$$\therefore \frac{AP}{AB} = \frac{AQ}{AC}$$

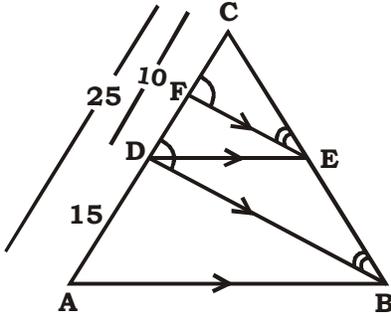
$\therefore \Delta PAQ \sim \Delta BAC$

$$\Rightarrow \frac{AP^2}{AB^2} = \frac{\text{Area of } \Delta PAQ}{\text{Area of } \Delta BAC}$$

$$\Rightarrow \frac{1^2}{(1+3)^2} = \frac{12}{\text{Area of } \Delta BAC}$$

$\Rightarrow$  Area of  $\triangle BAC = 12 \times 16 = 192\text{cm}^2$   
 $\therefore$  Area of  $BPQC = \text{Area of } \triangle BAC - \text{Area of } \triangle PAQ$   
 $= 192 - 12 = 180\text{cm}^2$

7. (d)



$\therefore DE \parallel AB$   
 $\therefore \triangle DCE \sim \triangle ACB$   
 $\Rightarrow \frac{CD}{AC} = \frac{EC}{BC} = \frac{10}{25} \dots\dots(i)$

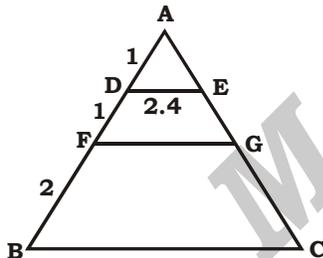
$\therefore EF \parallel BC$   
 $\therefore \triangle ECF \sim \triangle BCD$   
 $\Rightarrow \frac{CF}{CD} = \frac{EC}{CB} \dots\dots(ii)$

From eq<sup>n</sup> (i) and (ii)

$$\frac{10}{25} = \frac{CF}{10}$$

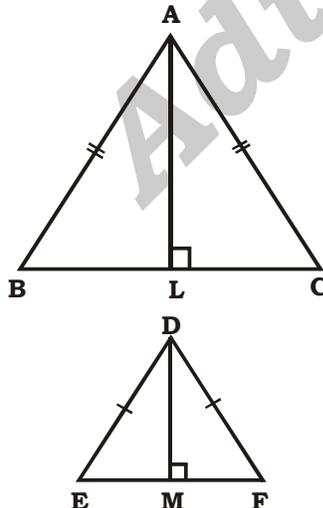
$$\Rightarrow CF = 4 \text{ cm}$$

8. (c)



By Midpoint theorem,  
 $DE : FG = 1 : 2$  and  $FG : BC = 1 : 2$   
 $\therefore DE : FG : BC = 1 : 2 : 4$   
 $\therefore 1 \text{ unit} = 2.4 \text{ cm}$   
 $\therefore 4 \text{ unit} = 9.6 \text{ cm}$

9. (b)



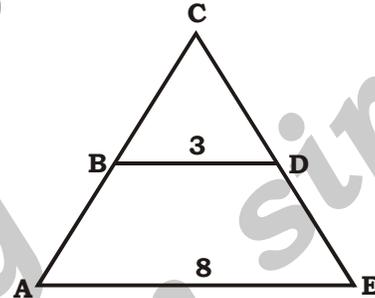
$$\therefore \frac{\text{Area of } \triangle ABC}{\text{Area of } \triangle DEF} = \frac{(AL)^2}{(DM)^2}$$

$$\Rightarrow \frac{AL^2}{DM^2} = \frac{9}{25}$$

$$\Rightarrow \frac{AL}{DM} = \frac{3}{5}$$

$$\therefore \frac{DM + AL}{DM - AL} = \frac{5 + 3}{5 - 3} = 4$$

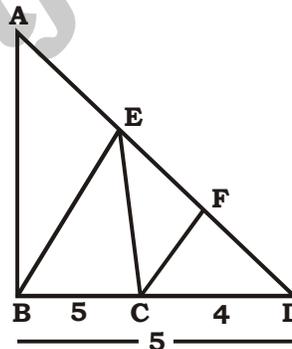
10. (a)



$\therefore BD \parallel AE$   
 $\therefore \triangle ACE \sim \triangle BCD$

$$\Rightarrow \frac{\text{Area of } \triangle BDC}{\text{Area of } \triangle AEC} = \frac{(BD)^2}{(AE)^2} = \frac{3^2}{8^2} = \frac{9}{64}$$

11. (a)



$\therefore BE \parallel CF$   
 $\therefore \triangle CDF \sim \triangle BDE$

$$\Rightarrow \frac{CD}{BC} = \frac{FD}{FE} \Rightarrow \frac{4}{5} = \frac{FD}{FE}$$

$\therefore AB \parallel CE$   
 $\therefore \triangle ABD \sim \triangle ECD$

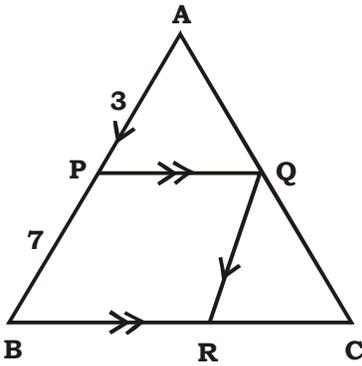
$$\Rightarrow \frac{CD}{BC} = \frac{DE}{AE}$$

$$\Rightarrow \frac{4}{5} = \frac{9}{AE} \quad \{ \because DE = FD + EF = 4 + 5 = 9 \}$$

$$\Rightarrow AE = \frac{45}{4}$$

$$\therefore AE : EF : FD = \frac{45}{4} : 5 : 4 = 45 : 20 : 16$$

12. (b)



$\therefore PQ \parallel BR$  or  $PQ \parallel BC$   
 $\therefore \Delta APQ \sim \Delta ABC$

$$\Rightarrow \frac{AP}{PB} = \frac{3}{7} = \frac{AQ}{QC} \dots\dots(i)$$

$\therefore AP \parallel QR$  or  $AB \parallel QR$   
 $\therefore \Delta RCQ \sim \Delta BCA$

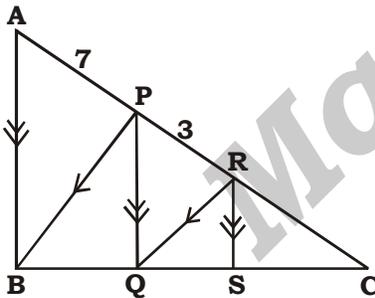
$$\Rightarrow \frac{CR}{BR} = \frac{CQ}{QA} \dots\dots(ii)$$

From eq<sup>n</sup> (i) & (ii)

$$\Rightarrow \frac{7}{3} = \frac{CR}{BR}$$

$$\therefore BR : RC = 3 : 7$$

13. (b)



Let,  $CR = x$

$\therefore \Delta BCP \sim \Delta QCR$

$$\therefore \frac{CR}{PR} = \frac{CQ}{BQ} = \frac{x}{3} \dots\dots(i)$$

$\therefore \Delta QCP \sim \Delta BCA$

$$\therefore \frac{CP}{AP} = \frac{CQ}{BQ} = \frac{(x+3)}{7} \dots\dots(ii)$$

Using eq<sup>n</sup> (i) & eq<sup>n</sup> (ii)

$$\Rightarrow \frac{x}{3} = \frac{x+3}{7}$$

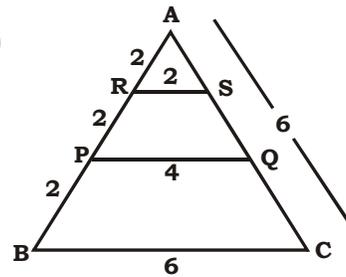
$$\Rightarrow 7x = 3x + 9$$

$$\Rightarrow 4x = 9$$

$$\Rightarrow x = \frac{9}{4}$$

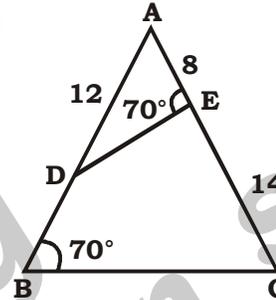
$$\therefore \frac{AP}{PC} = \frac{7}{3+x} = \frac{7}{3+\frac{9}{4}} = \frac{4}{3}$$

14. (b)



$$\text{Perimeter of } \square RSQP = PR + RS + SQ + PQ = 2 + 2 + 4 = 10 \text{ cm}$$

15. (c)



$\therefore \Delta DEA \sim \Delta CBA$

$$\therefore \frac{AD}{AC} = \frac{AE}{AB}$$

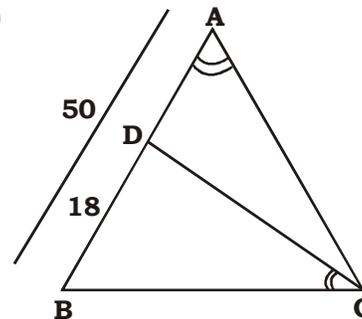
$$\Rightarrow \frac{12}{8+14} = \frac{8}{AD+DB}$$

$$\Rightarrow \frac{12}{22} = \frac{8}{12+BD}$$

$$\Rightarrow BD+12 = \frac{44}{3}$$

$$\Rightarrow BD = \frac{44}{3} - 12 = \frac{8}{3} \text{ cm}$$

16. (b)



$AB = 50 \text{ cm}, BD = 18 \text{ cm}$

$\therefore \Delta BCD \sim \Delta BAC$

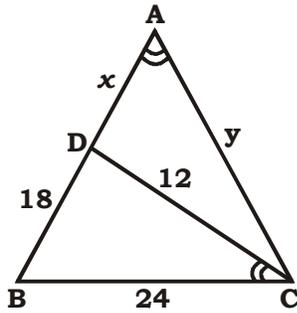
$$\therefore \frac{BC}{BA} = \frac{CD}{AC} = \frac{BD}{BC} \Rightarrow \frac{BC}{50} = \frac{CD}{AC} = \frac{18}{BC}$$

$$\Rightarrow BC^2 = 50 \times 18 = 100 \times 9$$

$$\Rightarrow BC = 30 \text{ cm}$$

$$\therefore \frac{\text{Perimeter of } \Delta BAC}{\text{Perimeter of } \Delta BCD} = \frac{BA}{BC} = \frac{50}{30} = \frac{5}{3}$$

17. (a)



$$\therefore \triangle BCD \sim \triangle BAC$$

$$\therefore \frac{BD}{BC} = \frac{BC}{AB} = \frac{CD}{AC}$$

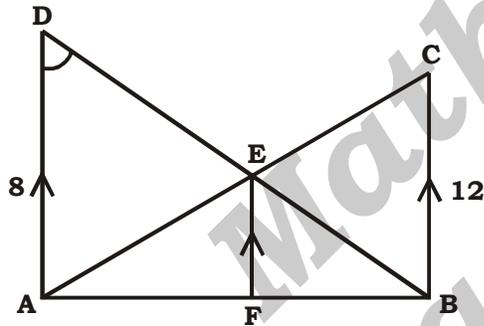
$$\Rightarrow \frac{18}{24} = \frac{24}{18+x} = \frac{12}{y}$$

$$\therefore \frac{18}{24} = \frac{24}{18+x} \Rightarrow x = 14 \text{ cm}$$

$$\therefore \frac{12}{y} = \frac{18}{24} \Rightarrow y = 16 \text{ cm}$$

$$\therefore \text{Perimeter of } \triangle ADC : \text{Perimeter of } \triangle BCD \\ = (14 + 12 + 16) : (12 + 24 + 18) \\ = 42 : 54 = 7 : 9$$

18. (a)

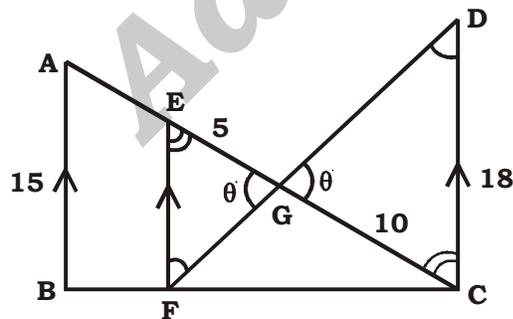


$$\therefore \frac{1}{EF} = \frac{1}{AD} + \frac{1}{BC}$$

$$\Rightarrow \frac{1}{EF} = \frac{1}{8} + \frac{1}{12} = \frac{5}{24}$$

$$\therefore FE = \frac{24}{5} = 4.8 \text{ unit}$$

19. (b)



$$\triangle FGE \sim \triangle DGC$$

$$\therefore \frac{EG}{GC} = \frac{EF}{DC}$$

$$\Rightarrow \frac{5}{10} = \frac{EF}{18}$$

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

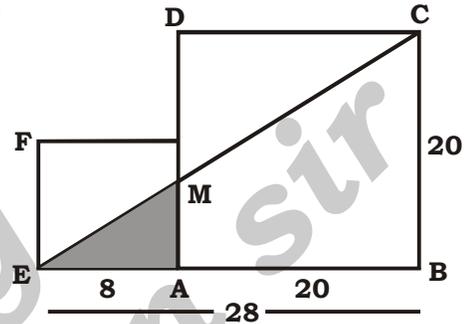
$$\triangle FCE \sim \triangle BCA$$

$$\therefore \frac{CE}{AC} = \frac{EF}{AB}$$

$$\Rightarrow \frac{15}{AC} = \frac{9}{15}$$

$$\Rightarrow AC = 25 \text{ cm}$$

20. (b)



$$\triangle EAM \sim \triangle EBC$$

$$\therefore \frac{EA}{EB} = \frac{AM}{BC}$$

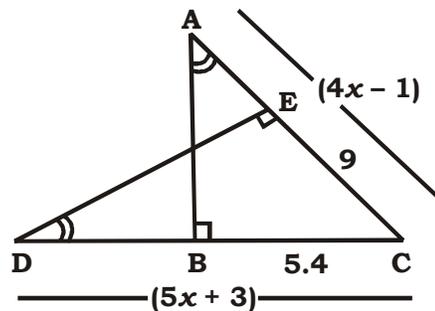
$$\Rightarrow \frac{8}{28} = \frac{AM}{20}$$

$$\Rightarrow AM = \frac{40}{7} \text{ cm}$$

$$\therefore \text{Area of shaded region} = \frac{1}{2} \times AM \times AE$$

$$= \frac{1}{2} \times \frac{40}{7} \times 8 = \frac{160}{7} \text{ cm}^2$$

21. (c)



$$\triangle ABC \sim \triangle DEC$$

$$\therefore \frac{(4x - 1)}{5.4} = \frac{(5x + 3)}{9}$$

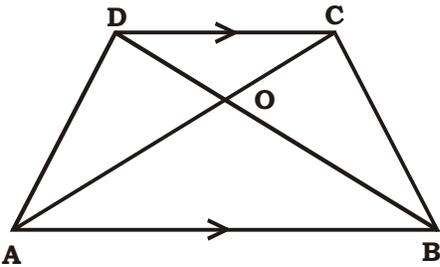
$$\Rightarrow 5(4x - 1) = 3(5x + 3)$$

$$\Rightarrow 20x - 5 = 15x + 9$$

$$\Rightarrow 5x = 14$$

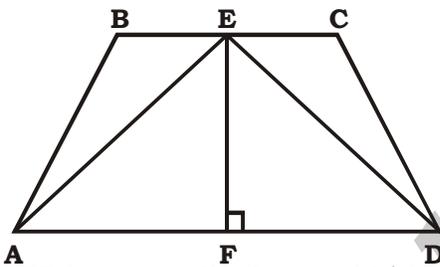
$$\Rightarrow x = \frac{14}{5} = 2.8 \text{ unit}$$

22. (a)



$$\begin{aligned} \therefore AB &= 2 \times CD \\ \therefore \frac{AB}{CD} &= \frac{2}{1} \\ \Rightarrow \frac{\text{Area of } \triangle AOB}{\text{Area of } \triangle COD} &= \left(\frac{AB}{CD}\right)^2 \\ \Rightarrow \frac{84}{\text{Area of } \triangle COD} &= \frac{4}{1} \\ \Rightarrow \text{Area of } \triangle COD &= 21 \text{ cm}^2 \end{aligned}$$

23. (d)



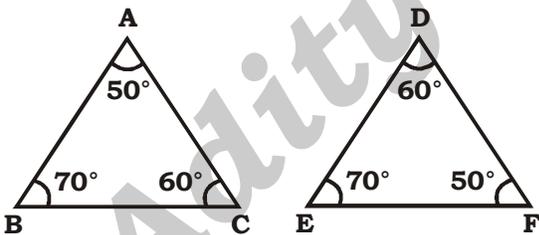
Let, EF is perpendicular on side AD.

$$\text{Area of trapezium ABCD} = \frac{1}{2} (AD + BC) \times EF$$

$$\text{Area of } \triangle AED = \frac{1}{2} \times AD \times EF$$

$$\therefore \text{Ratio} = \frac{\frac{1}{2} (AD + BC) \times EF}{\frac{1}{2} AD \times EF} = \frac{AD + BC}{AD}$$

24. (d)



In  $\triangle ABC$  and  $\triangle DEF$

$$\angle A = \angle F = 50^\circ$$

$$\angle B = \angle E = 70^\circ$$

$$\angle C = \angle D = 60^\circ$$

$\therefore \triangle ABC \sim \triangle FED$  (AAA Rule)

25. (c)

$$\begin{aligned} \text{CosA} &= \frac{b^2 + c^2 - a^2}{2bc} = \frac{24^2 + 30^2 - 18^2}{2 \times 24 \times 30} = \frac{576 + 900 - 324}{2 \times 24 \times 30} \\ &= \frac{1476 - 324}{2 \times 24 \times 30} = \frac{1152}{2 \times 24 \times 30} = \frac{24}{30} = \frac{4}{5} \end{aligned}$$

26. (d) Given,

$$(a + b + c)(a + b - c) = ab$$

$$\Rightarrow (a + b)^2 - c^2 = ab$$

$$\Rightarrow a^2 + b^2 + 2ab - c^2 = ab$$

$$\Rightarrow a^2 + b^2 - c^2 = -ab \dots\dots(i)$$

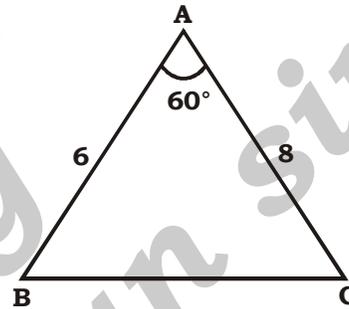
$\therefore$  By cosine Rule,

$$\text{CosC} = \frac{a^2 + b^2 - c^2}{2ab}$$

$$\Rightarrow \text{CosC} = \frac{-ab}{2ab} = \frac{-1}{2} \quad \{\text{using eqn (i)}\}$$

$$\Rightarrow \text{CosC} = \text{Cos}120^\circ \Rightarrow C = \frac{2\pi}{3}$$

27. (c)



$$\therefore \text{cos A} = \frac{b^2 + c^2 - a^2}{2bc}$$

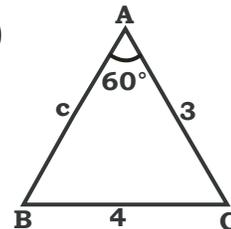
$$\Rightarrow \text{cos } 60^\circ = \frac{8^2 + 6^2 - a^2}{2 \times 8 \times 6}$$

$$\Rightarrow \frac{1}{2} = \frac{100 - a^2}{2 \times 6 \times 8}$$

$$\Rightarrow a^2 = 52$$

$$\Rightarrow a = \sqrt{52} \text{ cm}$$

28. (d)



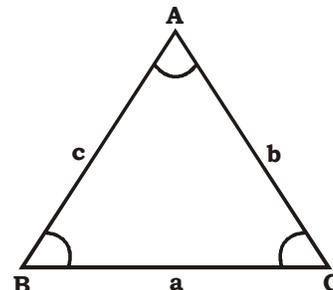
$$\therefore \text{Cos A} = \frac{c^2 + b^2 - a^2}{2 \times c \times b}$$

$$\Rightarrow \frac{1}{2} = \frac{c^2 + 9 - 16}{2 \times c \times 3}$$

$$\Rightarrow 3c = c^2 + 9 - 16$$

$$\Rightarrow c^2 - 3c - 7 = 0$$

29. (a)



∵ A, B and C are in AP

$$\therefore 2B = A + C$$

$$\therefore A + B + C = 180^\circ$$

$$\Rightarrow 2B + B = 180^\circ$$

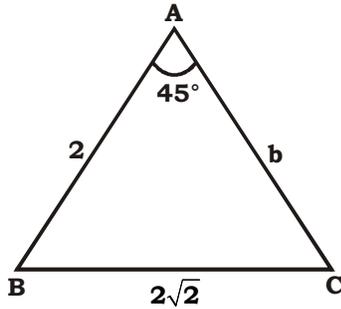
$$\Rightarrow B = 60^\circ$$

$$\therefore \frac{a}{\sin A} = \frac{b}{\sin B}$$

$$\Rightarrow \frac{b}{a} = \frac{\sin B}{\sin A} \Rightarrow \frac{\sqrt{3}}{1} = \frac{\sin 60^\circ}{\sin A} \Rightarrow \sin A = \frac{1}{2}$$

$$\Rightarrow A = 30^\circ$$

30. (a)



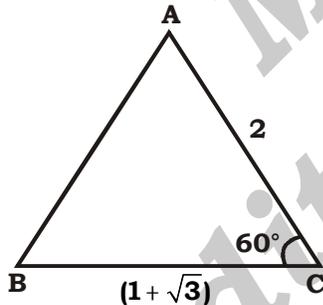
$$\therefore \frac{a}{\sin A} = \frac{c}{\sin C}$$

$$\Rightarrow \frac{2\sqrt{2}}{\sin 45^\circ} = \frac{2}{\sin C}$$

$$\Rightarrow \frac{2\sqrt{2}}{\frac{1}{\sqrt{2}}} = \frac{2}{\sin C}$$

$$\Rightarrow \sin C = \frac{1}{2} \Rightarrow C = 30^\circ$$

31. (a)



$$\therefore \cos C = \frac{b^2 + a^2 - c^2}{2ba}$$

$$\Rightarrow \cos 60^\circ = \frac{4 + (1 + \sqrt{3})^2 - c^2}{2 \times 2 \times (1 + \sqrt{3})}$$

$$\Rightarrow \frac{1}{2} = \frac{4 + 1 + 3 + 2\sqrt{3} - c^2}{4 \times (1 + \sqrt{3})}$$

$$\Rightarrow 2 + 2\sqrt{3} = 8 + 2\sqrt{3} - c^2$$

$$\Rightarrow c^2 = 6 \Rightarrow c = \sqrt{6}$$

$$\therefore \frac{b}{\sin B} = \frac{c}{\sin C}$$

$$\Rightarrow \frac{2}{\sin B} = \frac{\sqrt{6}}{\sin 60^\circ} \Rightarrow \frac{2}{\sin B} = \frac{\sqrt{6}}{\frac{\sqrt{3}}{2}}$$

$$\Rightarrow \sin B = \frac{1}{\sqrt{2}}$$

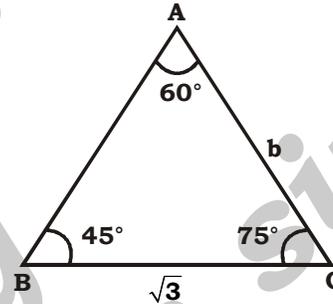
$$\Rightarrow \sin B = \sin 45^\circ$$

$$\Rightarrow B = 45^\circ$$

$$\Rightarrow A = 180^\circ - (60^\circ + 45^\circ) = 75^\circ$$

$$\therefore A \text{ and } B = 75^\circ \text{ and } 45^\circ$$

32. (b)



$$\therefore \angle B = 45^\circ, \angle C = 75^\circ$$

$$\text{So, } \angle A = 180^\circ - 45^\circ - 75^\circ = 60^\circ$$

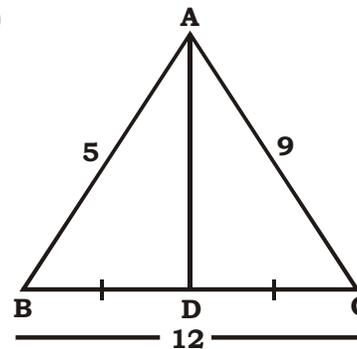
$$\therefore \frac{a}{\sin A} = \frac{b}{\sin B}$$

$$\Rightarrow \frac{\sqrt{3}}{\sin 60^\circ} = \frac{b}{\sin 45^\circ}$$

$$\Rightarrow \frac{\sqrt{3}}{\frac{\sqrt{3}}{2}} = \frac{b}{\frac{1}{\sqrt{2}}}$$

$$\Rightarrow b = \sqrt{2}$$

33. (b)



In  $\triangle ABC$ , Applying Apollonius theorem

$$AB^2 + AC^2 = 2 \left[ AD^2 + \left( \frac{BC}{2} \right)^2 \right]$$

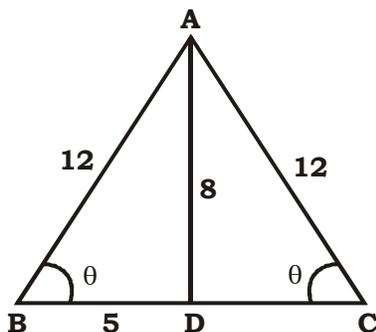
$$\Rightarrow 5^2 + 9^2 = 2 (AD^2 + 36)$$

$$\Rightarrow 106 = 2AD^2 + 72$$

$$\Rightarrow AD^2 = 17$$

$$\Rightarrow AD = \sqrt{17} \text{ cm}$$

34. (c)



Let  $CD = x$

In  $\triangle ABD$ ,

$$\cos \theta = \frac{AB^2 + BD^2 - AD^2}{2 \times AB \times BD}$$

$$\Rightarrow \cos \theta = \frac{12^2 + 5^2 - 8^2}{2 \times 12 \times 5} \dots\dots(i)$$

In  $\triangle ADC$ ,

$$\cos \theta = \frac{AC^2 + CD^2 - AD^2}{2 \times AC \times CD}$$

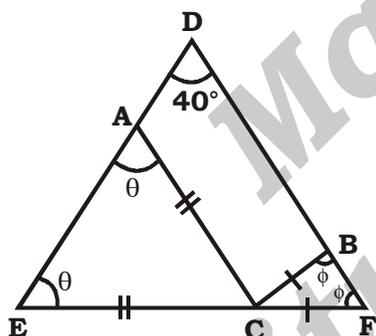
$$\Rightarrow \cos \theta = \frac{12^2 + x^2 - 8^2}{2 \times 12 \times x} \dots\dots(ii)$$

From eq<sup>n</sup> (i) & eq<sup>n</sup> (ii)

$$x = 16, 5$$

$$\Rightarrow CD = 16 \text{ cm}$$

35. (c)



In  $\triangle DEF$ ,

$$\theta + \phi = 140^\circ \dots\dots(i)$$

In  $\triangle BCF$ ,

$$\angle BCF = 180^\circ - 2\phi \dots\dots(ii)$$

In  $\triangle AEC$ ,

$$\angle ACE = 180^\circ - 2\theta \dots\dots(iii)$$

$$\therefore \angle ACB = 180^\circ - (\angle ACE + \angle BCF)$$

$$= 180^\circ - (180^\circ - 2\theta + 180^\circ - 2\phi)$$

$$\{\text{using eq}^n \text{ (ii) \& (iii)}\}$$

$$= 2(\theta + \phi) - 180^\circ$$

$$= 280^\circ - 180^\circ = 100^\circ \{\text{using eq}^n \text{ (i)}\}$$

36. (b) Area of triangle whose vertices are  $(x_1, y_1)$ ,  $(x_2, y_2)$ ,  $(x_3, y_3) =$

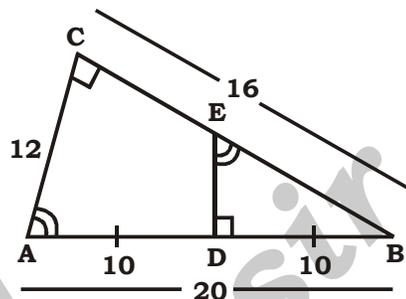
$$\left| \frac{x_1(y_2 - y_3) + x_2(y_3 - y_1) + x_3(y_1 - y_2)}{2} \right|$$

$\therefore$  Vertices =  $(a, a)$ ,  $(a + 1, a + 1)$ ,  $(a + 2, a)$

$$\therefore \text{Area} = \left| \frac{a(a+1-a) + (a+1)(a-a) + (a+2)(a-a-1)}{2} \right|$$

$$= \left| \frac{a-a-2}{2} \right| = \left| \frac{-2}{2} \right| = 1 \text{ unit}^2$$

37. (a)



$$BC = \sqrt{AB^2 - AC^2} = 16 \text{ cm.}$$

$\triangle EDB \sim \triangle ACB$

$$\therefore \frac{DE}{AC} = \frac{BD}{BC}$$

$$\Rightarrow \frac{DE}{12} = \frac{10}{16}$$

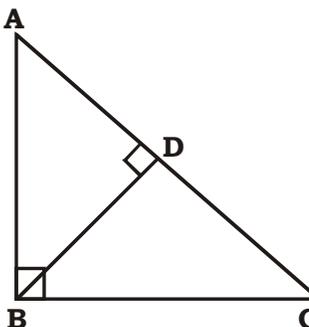
$$\Rightarrow DE = \frac{15}{2} \text{ cm}$$

$\therefore$  Area of quadrilateral ADEC = Area of  $\triangle ABC$  - Area of  $\triangle BDE$

$$= \frac{1}{2} \times 12 \times 16 - \frac{1}{2} \times \frac{15}{2} \times 10$$

$$= 96 - \frac{75}{2} = 58.5$$

38. (c)



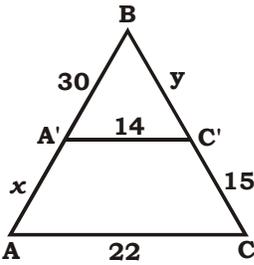
By the property of right angle triangle,

$$AD = \frac{AB^2}{AC}$$

$$\Rightarrow AD = \frac{8 \times 8}{17}$$

$$\Rightarrow AD = 3.76 \text{ cm}$$

39. (a)

 $\triangle BA'C' \sim \triangle BAC$ 

$$\therefore \frac{BA'}{BA} = \frac{BC'}{BC} = \frac{A'C'}{AC}$$

$$\Rightarrow \frac{30}{30+x} = \frac{y}{y+15} = \frac{14}{22} = \frac{7}{11}$$

$$\therefore 30 \times 11 = 7(30+x)$$

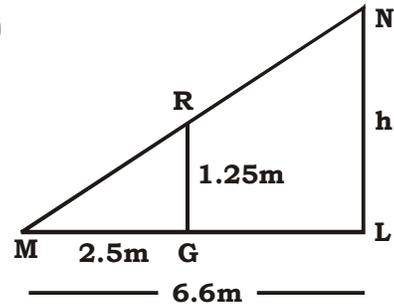
$$\Rightarrow x = \frac{120}{7}$$

$$\therefore 11 \times y = 7 \times (y+15)$$

$$\Rightarrow y = \frac{105}{4}$$

$$\therefore AA' = x = \frac{120}{7}, BC' = y = \frac{105}{4}$$

40. (c)



In the figure,

 $\triangle MLN, \triangle MGR$  are similar triangles.

$$\therefore \frac{GR}{LN} = \frac{MG}{ML}$$

$$\Rightarrow \frac{1.25}{h} = \frac{2.5}{6.6}$$

$$\Rightarrow 1.25 \times 6.6 = 2.5 \times h$$

$$\Rightarrow h = \frac{1.25 \times 6.6}{2.5} = 3.3 \text{ m}$$

 $\therefore$  Height of the lamp post is 3.3 m