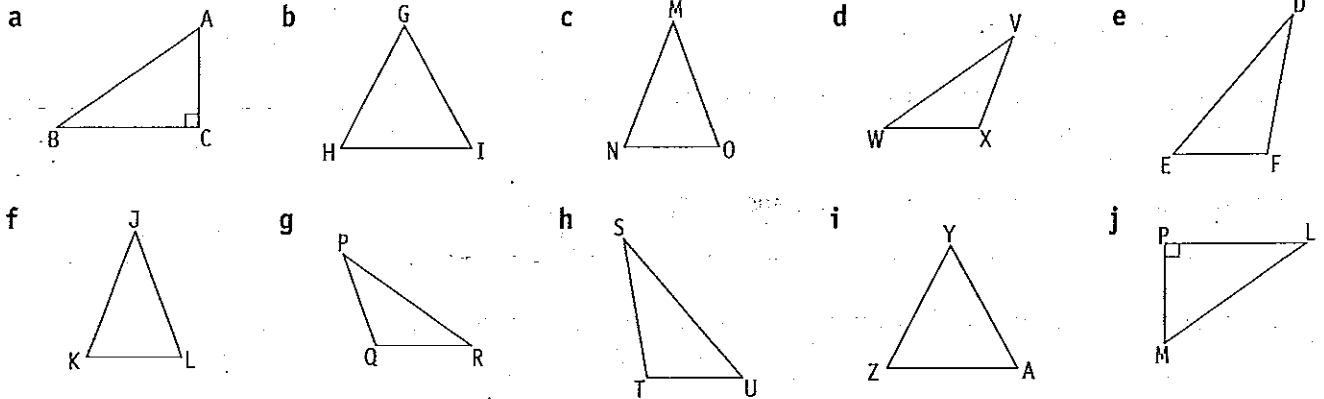


CHAPTER 10

Congruence and similarity

Recognising congruent triangles

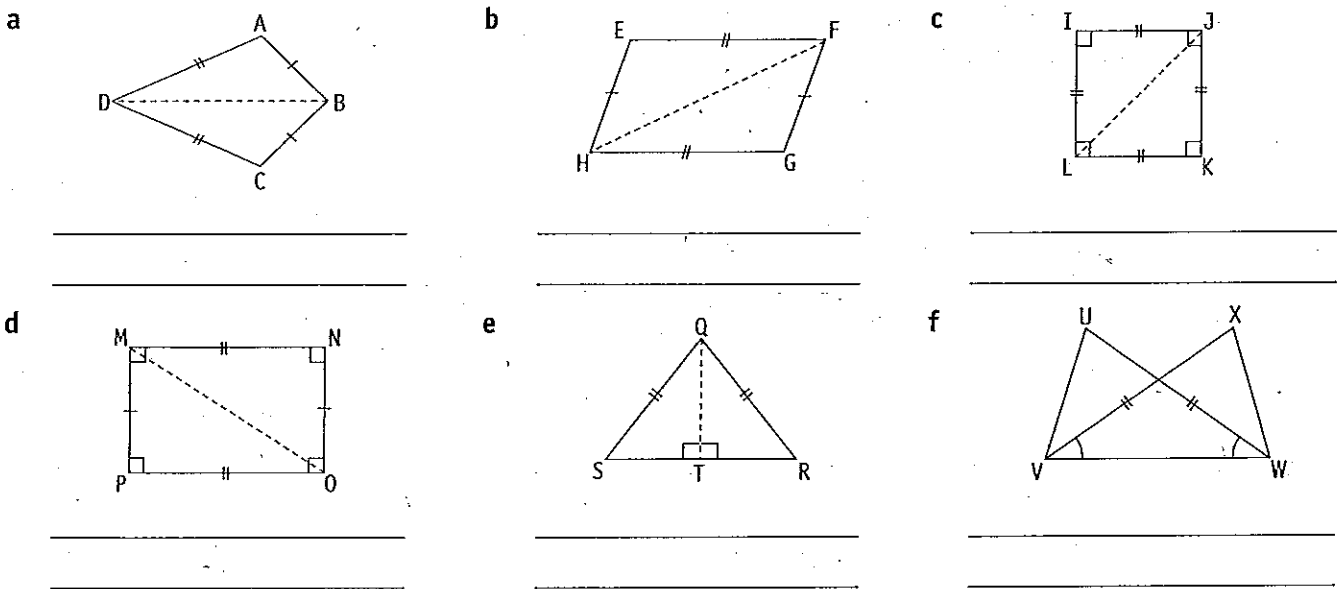
QUESTION 1 Name pairs of congruent triangles.



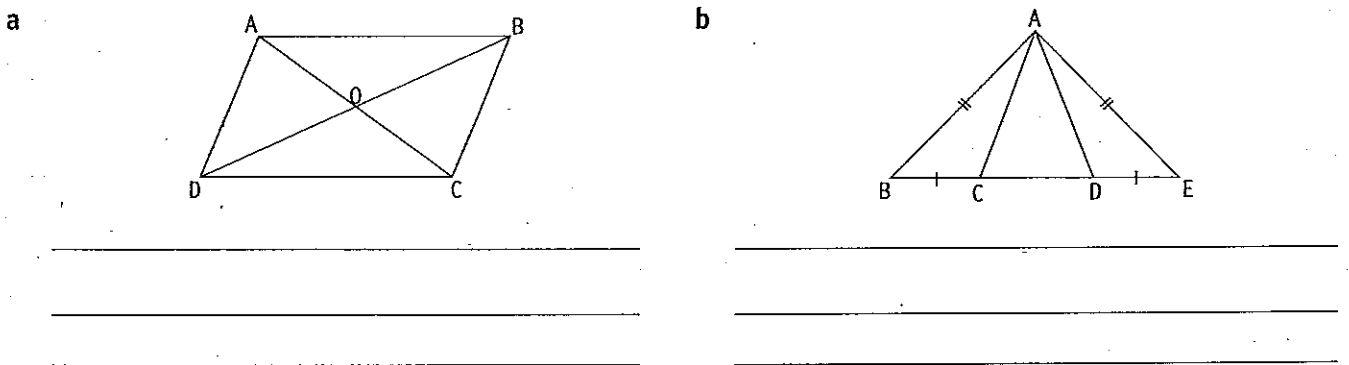
QUESTION 2 In the following pairs of congruent triangles:

i name all pairs of corresponding angles

ii name all pairs of corresponding sides



QUESTION 3 In the following shapes, name different pairs of congruent triangles.

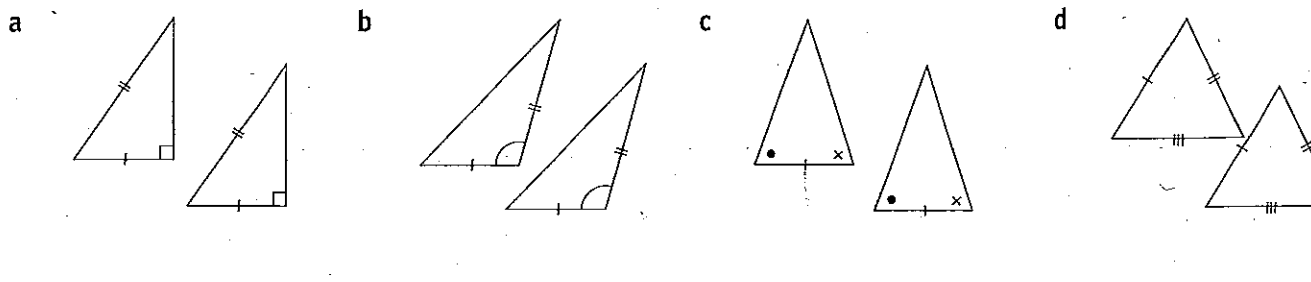


Tests for congruent triangles

QUESTION 1 Complete the following statements.

- The symbol for congruent triangles is _____.
- Two triangles are congruent if three sides of one triangle are equal to _____ of the other triangle.
- Two triangles are congruent if two angles and a side of one triangle are equal to _____ of the other triangle.
- Two triangles are congruent if two sides and the included angle of one triangle are equal to _____ of the other triangle.
- Two right-angled triangles are congruent if the hypotenuse and one side of one triangle are equal to _____ of the other triangle.

QUESTION 2 In each pair of triangles, write the congruence test that would be used to prove that the triangles are congruent.



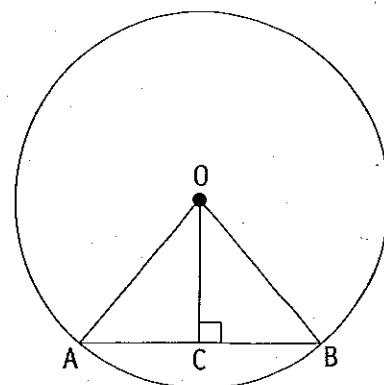
QUESTION 3 In the diagram, O is the centre of the circle. OC is drawn perpendicular to AB , in other words $OC \perp AB$.

- Name the common side in $\triangle OAC$ and $\triangle OBC$.

- Name the pair of sides that are equal.

- Are the triangles congruent?

- If they are congruent, name the test you can use to prove it.



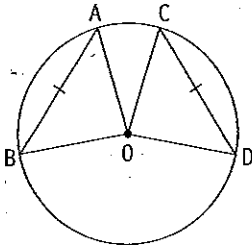
Congruence and similarity



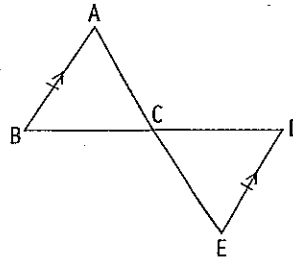
Proofs for congruent triangles

QUESTION 1 In each pair of triangles, prove that the triangles are congruent.

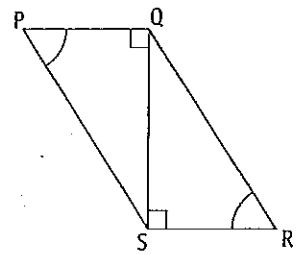
a



b

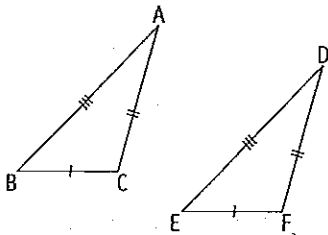


c

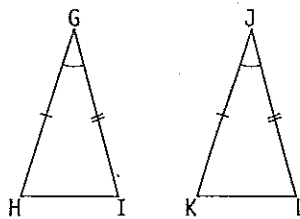


QUESTION 2 Prove that each pair of triangles are congruent.

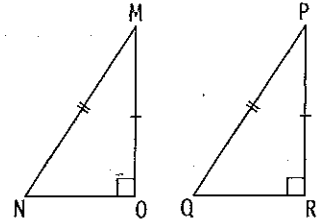
a



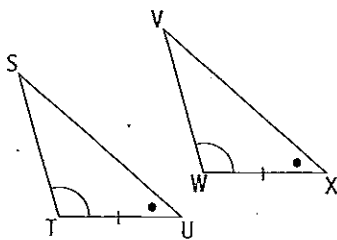
b



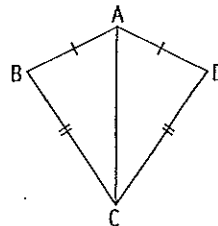
c



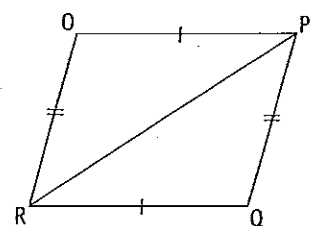
d



e



f

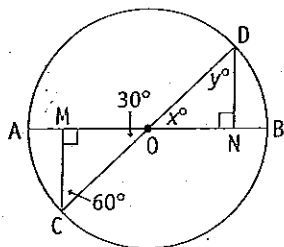


Congruence and similarity

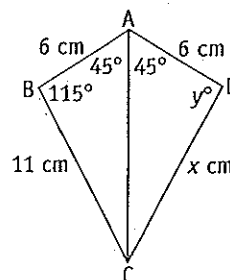
Using congruent triangles to find unknown sides and angles

QUESTION 1 Prove that each pair of triangles are congruent and then find the value of the pronumeral.

a

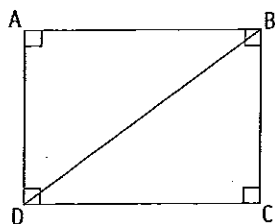


b

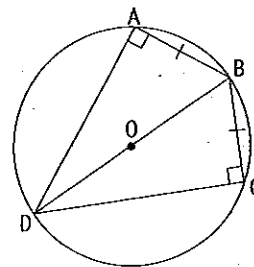


QUESTION 2

a ABCD is a rectangle.
Prove that $\triangle DAB \equiv \triangle DCB$



b O is the centre of the circle and $AB = BC$
Prove that $\triangle ABD \equiv \triangle CBD$





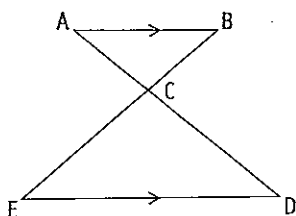
Tests for similar triangles

QUESTION 1 Complete the following statements.

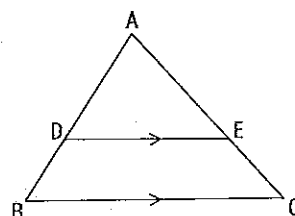
- The symbol for similar triangles is _____.
- Two triangles are similar if two angles of one triangle are equal to _____ of the other triangle.
- Two triangles are similar if their corresponding sides are in the _____.
- Two triangles are similar if one angle of one triangle is equal to _____ of the other and the lengths of the sides that form the angle are in the _____.
- All similar triangles may or may not be _____ triangles.

QUESTION 2 In each diagram, write the test for similarity that would be used to prove that the triangles are similar.

a



b

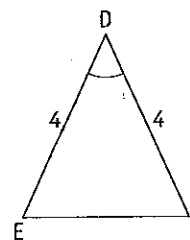
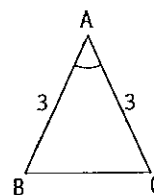


QUESTION 3 The triangles shown are similar triangles.

- a Write the test used for similar triangles.

- b List the pairs of corresponding angles.

- c List the pairs of corresponding sides.



Congruence and similarity

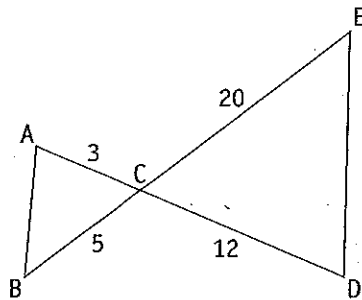
Proving that triangles are similar

QUESTION 1 For the following statements, write true or false.

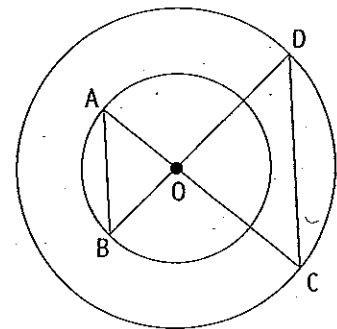
- a All congruent triangles are similar. _____
- b All similar triangles are congruent. _____
- c All scalene triangles are similar. _____
- d All acute-angled triangles are similar. _____
- e All obtuse-angled triangles are similar. _____
- f All right-angled triangles are similar. _____
- g All isosceles triangles are similar. _____
- h All equiangular triangles are similar. _____

QUESTION 2 In each diagram, prove that the triangles are similar.

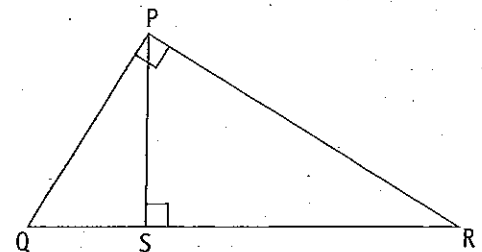
a



b



QUESTION 3 Name three similar triangles in the diagram.



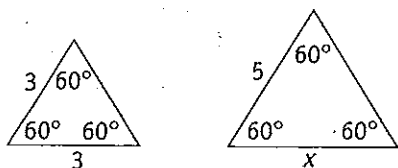
Congruence and similarity



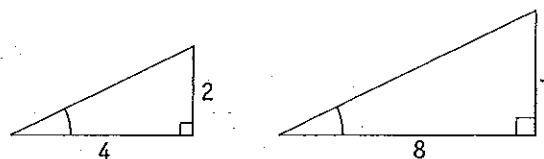
Using similar triangles to find the value of pronumerals

QUESTION 1 In each diagram, use a test of similarity to find the value of the pronumeral.

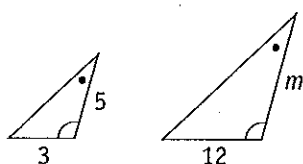
a



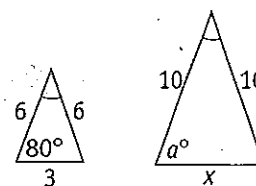
b



c

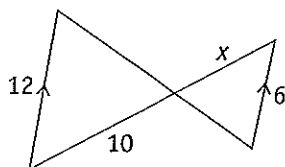


d

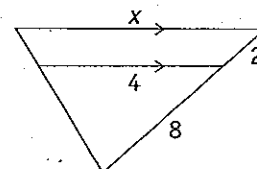


QUESTION 2 In each diagram, use a test of similarity to find the value of the pronumeral.

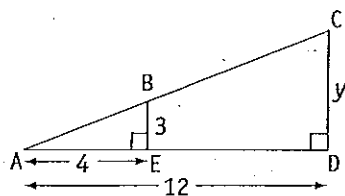
a



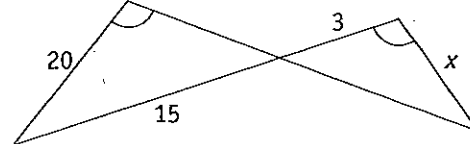
b



c



d



Congruence and similarity

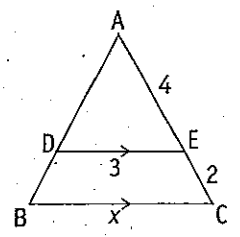
Problem solving with congruency and similarity

1 In $\triangle ABC$, DE is parallel to BC .

a Name the test used for similar triangles.

b Write the ratio of the corresponding sides.

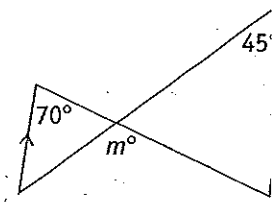
c Find the value of x .



2 In the diagram on the right:

a Name the test used for similar triangles.

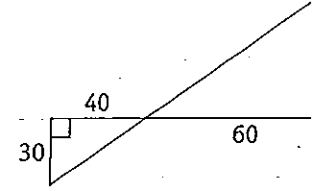
b Find the value of m .



3 In the diagram:

a Name the test used for similar triangles.

b Find the value of y .



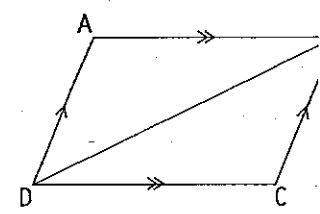
4 In the diagram given:

a Name the common side.

b Name the two pairs of angles that are equal.

c Is $\triangle ABD \cong \triangle CDB$?

d Name the test you can use to prove it.

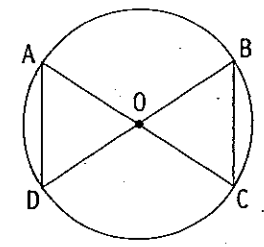


5 O is the centre of a circle with radius 12 cm.

a Name all the lines that are 12 cm long.

b Name an angle equal to $\angle AOD$.

c Prove that $\triangle AOD \cong \triangle BOC$



Congruence and similarity

TOPIC TEST

PART A

- Instructions**
- This part consists of 15 multiple choice questions
 - Fill in only ONE CIRCLE for each question
 - Each question is worth 1 mark
 - Calculators may be used

Time allowed: 15 minutes

Total marks = 15

	Marks
1 The symbol for congruent triangles is <input type="radio"/> (A) \parallel <input type="radio"/> (B) \equiv <input type="radio"/> (C) \parallel <input type="radio"/> (D) $=$	1
2 The symbol for similar triangles is <input type="radio"/> (A) \parallel <input type="radio"/> (B) \equiv <input type="radio"/> (C) \parallel <input type="radio"/> (D) $=$	1
3 All congruent triangles are <input type="radio"/> (A) equilateral <input type="radio"/> (B) isosceles <input type="radio"/> (C) similar <input type="radio"/> (D) right-angled	1
4 In congruent triangles the lengths of the corresponding sides are <input type="radio"/> (A) equal <input type="radio"/> (B) different <input type="radio"/> (C) in ratio 1:2 <input type="radio"/> (D) none of these	1
5 When two triangles are congruent, their corresponding angles are <input type="radio"/> (A) different <input type="radio"/> (B) same size <input type="radio"/> (C) in ratio 1:2 <input type="radio"/> (D) none of these	1
6 Two triangles are congruent if they are of the <input type="radio"/> (A) same shape <input type="radio"/> (B) same area <input type="radio"/> (C) same shape and size <input type="radio"/> (D) none of these	1
7 All similar triangles are <input type="radio"/> (A) different <input type="radio"/> (B) congruent <input type="radio"/> (C) equilateral <input type="radio"/> (D) equiangular	1
8 A diagonal of a rhombus divides the rhombus into two triangles that are <input type="radio"/> (A) equilateral <input type="radio"/> (B) isosceles <input type="radio"/> (C) congruent <input type="radio"/> (D) none of these	1
9 Two triangles are similar if they have the <input type="radio"/> (A) same shape <input type="radio"/> (B) different shape <input type="radio"/> (C) same area <input type="radio"/> (D) different area	1
10 The longer diagonal of a kite divides it into two triangles that are <input type="radio"/> (A) isosceles <input type="radio"/> (B) equilateral <input type="radio"/> (C) congruent <input type="radio"/> (D) none of these	1

-
- 11** The two diagonals of a square divide it into four triangles that are
Ⓐ isosceles Ⓑ equilateral Ⓒ congruent Ⓓ none of these
- 12** If the corresponding angles of two triangles are equal, the triangles are definitely
Ⓐ congruent Ⓑ similar Ⓒ isosceles Ⓓ equilateral
- 13** If the corresponding sides of two triangles are in the same ratio, the triangles are definitely
Ⓐ congruent Ⓑ similar Ⓒ isosceles Ⓓ equilateral
- 14** In two triangles, if the corresponding sides and the included angles are equal, the triangles are
Ⓐ congruent Ⓑ similar Ⓒ isosceles Ⓓ equilateral
- 15** In two triangles, if the corresponding sides are in the same ratio and the included angles are equal, the triangles are definitely
Ⓐ congruent Ⓑ similar Ⓒ isosceles Ⓓ equilateral
-

Total marks achieved for PART A

Congruence and similarity

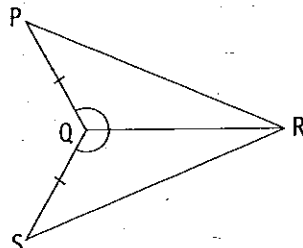
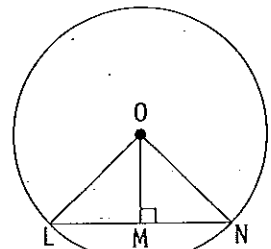
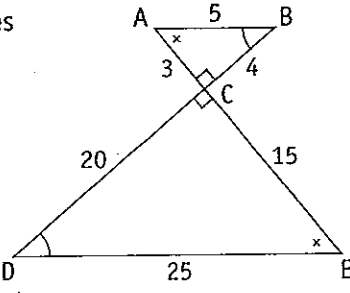
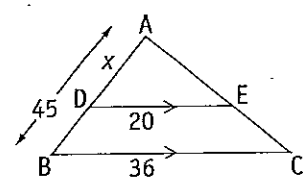
TOPIC TEST

PART B

- Instructions**
- This part consists of 15 questions
 - Each question is worth 1 mark
 - Write answers in the 'Answers only' column

Time allowed: 15 minutes

Total marks = 15

Questions	Answers only	Mark
<p>Look at the diagram to the right.</p>  <p>1 Name the pairs of equal sides.</p> <p>2 Name the pairs of equal angles.</p> <p>3 Name triangles that are congruent.</p> <p>4 State the congruence test.</p>	<p>_____</p> <p>_____</p> <p>_____</p> <p>_____</p>	<p>1</p> <p>1</p> <p>1</p> <p>1</p>
<p>Look at the diagram to the right.</p>  <p>5 Name the pairs of equal sides.</p> <p>6 Name the pairs of equal angles.</p> <p>7 Name triangles that are congruent.</p> <p>8 State the congruency test.</p>	<p>_____</p> <p>_____</p> <p>_____</p> <p>_____</p>	<p>1</p> <p>1</p> <p>1</p> <p>1</p>
<p>Look at the diagram to the right.</p>  <p>9 Name the pairs of corresponding angles that are equal.</p> <p>10 Find the ratios $\frac{AB}{DE}$, $\frac{AC}{CE}$ and $\frac{BC}{CD}$</p> <p>11 Does $\frac{AB}{DE} = \frac{AC}{CE} = \frac{BC}{CD}$</p> <p>12 Are the triangles similar?</p> <p>13 State the test that proves similarity.</p>	<p>_____</p> <p>_____</p> <p>_____</p> <p>_____</p> <p>_____</p>	<p>1</p> <p>1</p> <p>1</p> <p>1</p> <p>1</p>
<p>Look at the diagram to the right.</p>  <p>14 State the test that proves similarity.</p> <p>15 Find the value of x.</p>	<p>_____</p> <p>_____</p>	<p>1</p> <p>1</p>

Total marks achieved for PART B

Congruence and similarity

TOPIC TEST

PART C

- Instructions**
- This part consists of 4 questions
 - Each question is worth 5 marks
 - Show all necessary working

Time allowed: 20 minutes

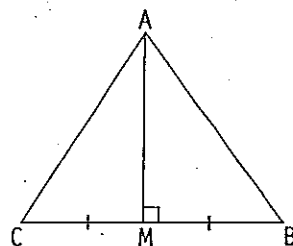
Total marks = 20

- 1** Complete the congruent triangles proof to show $\triangle ABM \equiv \triangle ACM$

In $\triangle ABM$ and $\triangle ACM$ _____

By test _____

$\therefore \triangle ABM \equiv \triangle ACM$

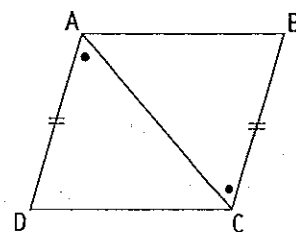


Marks

5

- 2 a** Prove that $\triangle ABC \equiv \triangle CDA$

- b** Hence, prove $AB \parallel DC$



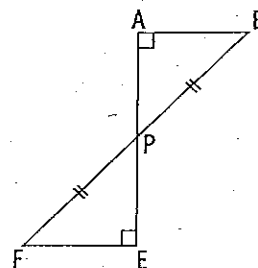
5

- 3** AE and BF intersect at P. $PF = PB$, $\angle PAB = 90^\circ$ and $\angle PEF = 90^\circ$

- a** Aim: To prove that $AP = PE$

Proof: _____

- b** If AF and BE are drawn, what type of quadrilateral is ABEF? Why?

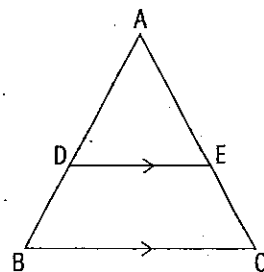


5

- 4 a** Prove that $\triangle ABC$ is similar to $\triangle ADE$

- b** State the test. _____

- c** Hence, write the ratio of the corresponding sides.



5

Total marks achieved for PART C

20

Answers

PAGE 112 1 $\frac{1}{4}$ 2 a $\frac{4}{11}$ b $\frac{4}{11}$ c $\frac{7}{11}$ d $\frac{3}{11}$ 3 a $\frac{1}{2}$ b 0 c $\frac{1}{3}$ 4 a $\frac{4}{7}$ b $\frac{3}{7}$ c $\frac{1}{7}$ d $\frac{2}{7}$ e $\frac{4}{7}$ 5 a $\frac{2}{5}$ b $\frac{4}{15}$

c 0 d $\frac{1}{3}$ e 1 f $\frac{3}{5}$

PAGES 113 & 114 1 C 2 C 3 C 4 B 5 C 6 D 7 B 8 D 9 D 10 A 11 A 12 C 13 D 14 D 15 C

PAGE 115 1 3.6 2 3 3 3 4 5 5 3 6 3 7 2.88 8 3 9 $\frac{1}{6}$ 10 0 11 $\frac{2}{3}$ 12 $\frac{1}{2}$ 13 $\frac{1}{2}$ 14 $\frac{1}{2}$ 15 $\frac{1}{5}$

PAGE 116 1 a 2 b 6.125 c 2, 2, 3, 5, 6, 8, 11, 12 d 5.5 e 10 2 a 7 b 4 c $\frac{4}{7}$ d $\frac{2}{7}$ e $\frac{5}{7}$ 3 a $\frac{1}{4}$ b $\frac{1}{2}$

c $\frac{1}{2}$ d $\frac{1}{2}$ e $\frac{1}{4}$ 4 a 5 b 25 c 5 d 30 e 8

PAGE 117 1 $\triangle ABC$ and $\triangle PML$; $\triangle GHI$ and $\triangle AYZ$; $\triangle MNO$ and $\triangle JKL$; $\triangle VWX$ and $\triangle PRQ$; $\triangle DEF$ and $\triangle SUT$ 2 a i $\angle A$ and $\angle C$; $\angle ADB$ and $\angle CDB$; $\angle ABD$ and $\angle DBC$ ii $AD = DC$; $AB = BC$; $BD = BD$ b i $\angle E = \angle G$, $\angle EHF = \angle GFH$, $\angle EFH = \angle GHF$ ii $EH = FG$, $EF = HG$, $HF = HF$ c i $\angle I = \angle K$, $\angle ILJ = \angle JLK$, $\angle IJL = \angle KJL$ ii $IJ = LK$, $IL = JK$, $LJ = LJ$ d i $\angle P = \angle N$, $\angle PMO = \angle NOM$, $\angle POM = \angle NMO$ ii $MN = PO$, $MP = NO$, $MO = MO$ e i $\angle QTS = \angle QTR$, $\angle S = \angle R$, $\angle SQT = \angle RQT$ ii $QS = QR$, $QT = QT$, $ST = RT$ f i $\angle U = \angle X$, $\angle UWV = \angle XWV$, $\angle UVW = \angle XWV$ ii $UV = XW$, $VW = VW$, $UW = XV$ 3 a $\triangle AOD \cong \triangle BOC$; $\triangle AOB \cong \triangle COD$; $\triangle ADC \cong \triangle ABC$; $\triangle ABD \cong \triangle CBD$ b $\triangle ABC \cong \triangle AED$ and $\triangle ABD \cong \triangle AEC$

PAGE 118 1 a \cong b three sides c two angles and a side d two sides and the included angle e the hypotenuse and one side 2 a RHS b SAS c AAS d SSS 3 a OC b $OA = OB$ c yes d RHS

PAGE 119 1 a SSS b AAS c AAS 2 a SSS b SAS c RHS d AAS e SSS f SSS

PAGE 120 1 a AAS; $x = 30^\circ$, $y = 60^\circ$ b SAS; $x = 11\text{cm}$, $y = 115^\circ$ 2 a SSS or SAS or RHS b RHS

PAGE 121 1 a \parallel b two angles c same ratio d one angle; the same ratio e congruent 2 a equiangular b equiangular 3 a Two

sides in the same ratio and included angle is equal to included angle. b $\angle A = \angle D$; $\angle B = \angle E$; $\angle C = \angle F$ c $\frac{AB}{DE} = \frac{AC}{DF} = \frac{BC}{EF}$

PAGE 122 1 a true b false c false d false e false f false g false h true 2 a $\frac{3}{12} = \frac{5}{20}$ and $\angle ACB = \angle ECD$ b $\frac{AO}{OC} = \frac{BO}{OD}$

and $\angle AOB = \angle DOC$ 3 $\triangle QSP$, $\triangle PSR$, $\triangle QPR$

PAGE 123 1 a equiangular; $x = 5$ b equiangular; $y = 4$ c equiangular; $m = 20$ d two sides and the included angle; $a = 80$, $x = 5$ 2 a equiangular; $x = 5$ b equiangular; $x = 5$ c equiangular; $y = 9$ d equiangular; $x = 4$

PAGE 124 1 a equiangular b $\frac{x}{3} = \frac{6}{4}$ c $x = 4\frac{1}{2}$ 2 a equiangular b $m = 115$ 3 a equiangular b $y = 45$ 4 a BD

b $\angle A = \angle C$; $\angle ADB = \angle CBD$ c yes d AAS 5 a $AO = CO = BO = DO = 12\text{cm}$ b $\angle BOC$ c SAS

PAGES 125 & 126 1 B 2 A 3 C 4 A 5 B 6 C 7 D 8 C 9 A 10 C 11 C 12 B 13 B 14 A 15 B

PAGE 127 1 $PQ = QS$, $QR = QR$ 2 $\angle PQR = \angle SQR$ 3 $\triangle PQR \cong \triangle SQR$ 4 SAS 5 $OL = ON$; $OM = OM$ 6 $\angle OML = \angle OMN$; $\angle OLM = \angle ONM$; $\angle LOM = \angle NOM$ 7 $\triangle OML \cong \triangle OMN$ 8 RHS 9 $\angle ACB = \angle DCE$; $\angle CAB = \angle CED$; $\angle ABC = \angle CDE$

10 $\frac{5}{25}$, $\frac{3}{15}$, $\frac{4}{20}$ 11 yes 12 yes 13 The sides are in the same ratio, $\frac{AB}{DE} = \frac{AC}{CE} = \frac{BC}{CD} = \frac{1}{5}$ 14 equiangular 15 $x = 25$

PAGE 128 1 $\angle AMB = \angle AMC$, $CM = BM$, $AM = AM$; SAS 2 a $\angle D = \angle B$, $AD = CB$, $AC = AC$; SAS b $\angle BAC = \angle DCA$, $AB \parallel DC$ (alternate angles equal) 3 a $\angle BAP = \angle FEP$, $\angle BPA = \angle FPA$, $BP = FP$; AAS; $\therefore AP = PE$ b parallelogram; diagonals bisect 4 a $\angle ADE = \angle ABC$,

$\angle A = \angle A$, $\angle AED = \angle ACB$ b equiangular c $\frac{AD}{AB} = \frac{AE}{AC} = \frac{DE}{BC}$

PAGES 129 & 130 1 D 2 C 3 A 4 B 5 A 6 D 7 C 8 D 9 C 10 A 11 A 12 C 13 D 14 D 15 B

PAGE 131 1 202.80 2 15.625 3 $1\frac{8}{25}$ 4 \$117.36 5 49 6 5:8 7 $125a^9$ 8 $\frac{4m}{5}$ 9 $-a - 2b$ 10 a 11 $y + 3$

12 $\frac{1}{4}$ 13 $\frac{1}{9}$ 14 x^{12} 15 143.11

PAGE 132 1 a $19a$ b $21axy + 30xy$ c $\frac{10n}{3}$ d $243x^{15}y^{10}$ e $2x^3y^2z$ 2 a \$718.76 b \$1080 c \$120 d 80% e \$19.20

3 a $2m + 2n$; mn b $x + 2y + 3z$; xy c $P = S - C$ 4 a $\frac{4x}{5}$ b 0 c $\frac{a^2}{10}$ d $\frac{8m^2}{35}$ e $\frac{4}{3}x^5y^2$

Answers

PAGE 112 1 $\frac{1}{4}$ 2 a $\frac{4}{11}$ b $\frac{4}{11}$ c $\frac{7}{11}$ d $\frac{3}{11}$ 3 a $\frac{1}{2}$ b 0 c $\frac{1}{3}$ 4 a $\frac{4}{7}$ b $\frac{3}{7}$ c $\frac{1}{7}$ d $\frac{2}{7}$ e $\frac{4}{7}$ 5 a $\frac{2}{5}$ b $\frac{4}{15}$

c 0 d $\frac{1}{3}$ e 1 f $\frac{3}{5}$

PAGES 113 & 114 1 C 2 C 3 C 4 B 5 C 6 D 7 B 8 D 9 D 10 A 11 A 12 C 13 D 14 D 15 C

PAGE 115 1 3.6 2 3 3 3 4 5 5 3 6 3 7 2.88 8 3 9 $\frac{1}{6}$ 10 0 11 $\frac{2}{3}$ 12 $\frac{1}{2}$ 13 $\frac{1}{2}$ 14 $\frac{1}{2}$ 15 $\frac{1}{5}$

PAGE 116 1 a 2 b 6.125 c 2, 2, 3, 5, 6, 8, 11, 12 d 5.5 e 10 2 a 7 b 4 c $\frac{4}{7}$ d $\frac{2}{7}$ e $\frac{5}{7}$ 3 a $\frac{1}{4}$ b $\frac{1}{2}$

c $\frac{1}{2}$ d $\frac{1}{2}$ e $\frac{1}{4}$ 4 a 5 b 25 c 5 d 30 e 8

PAGE 117 1 $\triangle ABC$ and $\triangle PML$; $\triangle GHI$ and $\triangle AYZ$; $\triangle MNO$ and $\triangle JKL$; $\triangle VWX$ and $\triangle PRQ$; $\triangle DEF$ and $\triangle SUT$ 2 a i $\angle A$ and $\angle C$; $\angle ADB$ and $\angle CDB$; $\angle ABD$ and $\angle DBC$ ii $AD = DC$; $AB = BC$; $BD = BD$ b i $\angle E = \angle G$, $\angle EHF = \angle GFH$, $\angle EFH = \angle GHF$ ii $EH = FG$, $EF = HG$, $HF = HF$ c i $\angle I = \angle K$, $\angle ILJ = \angle JLK$, $\angle IJL = \angle KJL$ ii $IJ = LK$, $IL = JK$, $LJ = LJ$ d i $\angle P = \angle N$, $\angle PMO = \angle NOM$, $\angle POM = \angle NMO$ ii $MN = PO$, $MP = NO$, $MO = MO$ e i $\angle QTS = \angle QTR$, $\angle S = \angle R$, $\angle SQT = \angle RQT$ ii $QS = QR$, $QT = QT$, $ST = RT$ f i $\angle U = \angle X$, $\angle UWV = \angle XWV$, $\angle UVW = \angle XWV$ ii $UV = XW$, $VW = VW$, $UW = XV$ 3 a $\triangle AOD \cong \triangle BOC$; $\triangle AOB \cong \triangle COD$; $\triangle ADC \cong \triangle ABC$; $\triangle ABD \cong \triangle CBD$ b $\triangle ABC \cong \triangle AED$ and $\triangle ABD \cong \triangle AEC$

PAGE 118 1 a = b three sides c two angles and a side d two sides and the included angle e the hypotenuse and one side 2 a RHS b SAS c AAS d SSS 3 a OC b $OA = OB$ c yes d RHS

PAGE 119 1 a SSS b AAS c AAS 2 a SSS b SAS c RHS d AAS e SSS f SSS

PAGE 120 1 a AAS; $x = 30^\circ$, $y = 60^\circ$ b SAS; $x = 11\text{cm}$, $y = 115^\circ$ 2 a SSS or SAS or RHS b RHS

PAGE 121 1 a ||| b two angles c same ratio d one angle; the same ratio e congruent 2 a equiangular b equiangular 3 a Two

sides in the same ratio and included angle is equal to included angle. b $\angle A = \angle D$; $\angle B = \angle E$; $\angle C = \angle F$ c $\frac{AB}{DE} = \frac{AC}{DF} = \frac{BC}{EF}$

PAGE 122 1 a true b false c false d false e false f false g false h true 2 a $\frac{3}{12} = \frac{5}{20}$ and $\angle ACB = \angle ECD$ b $\frac{AO}{OC} = \frac{BO}{OD}$

and $\angle AOB = \angle DOC$ 3 $\triangle QSP$, $\triangle PSR$, $\triangle QPR$

PAGE 123 1 a equiangular; $x = 5$ b equiangular; $y = 4$ c equiangular; $m = 20$ d two sides and the included angle; $a = 80$, $x = 5$ 2 a equiangular; $x = 5$ b equiangular; $x = 5$ c equiangular; $y = 9$ d equiangular; $x = 4$

PAGE 124 1 a equiangular b $\frac{x}{3} = \frac{6}{4}$ c $x = 4\frac{1}{2}$ 2 a equiangular b $m = 115$ 3 a equiangular b $y = 45$ 4 a BD

b $\angle A = \angle C$; $\angle ADB = \angle CBD$ c yes d AAS 5 a $AO = CO = BO = DO = 12\text{cm}$ b $\angle BOC$ c SAS

PAGES 125 & 126 1 B 2 A 3 C 4 A 5 B 6 C 7 D 8 C 9 A 10 C 11 C 12 B 13 B 14 A 15 B

PAGE 127 1 $PQ = QS$, $QR = QR$ 2 $\angle PQR = \angle SQR$ 3 $\triangle PQR \cong \triangle SQR$ 4 SAS 5 $OL = ON$; $OM = OM$ 6 $\angle OML = \angle OMN$; $\angle OLM = \angle ONM$; $\angle LOM = \angle NOM$ 7 $\triangle OML \cong \triangle OMN$ 8 RHS 9 $\angle ACB = \angle DCE$; $\angle CAB = \angle CED$; $\angle ABC = \angle CDE$

10 $\frac{5}{25}$, $\frac{3}{15}$, $\frac{4}{20}$ 11 yes 12 yes 13 The sides are in the same ratio, $\frac{AB}{DE} = \frac{AC}{CE} = \frac{BC}{CD} = \frac{1}{5}$ 14 equiangular 15 $x = 25$

PAGE 128 1 $\angle AMB = \angle AMC$, $CM = BM$, $AM = AM$; SAS 2 a $\angle D = \angle B$, $AD = CB$, $AC = AC$; SAS b $\angle BAC = \angle DCA$, $AB \parallel DC$ (alternate angles equal) 3 a $\angle BAP = \angle FEP$, $\angle BPA = \angle FPA$, $BP = FP$; AAS; $\therefore AP = PE$ b parallelogram; diagonals bisect 4 a $\angle ADE = \angle ABC$,

$\angle A = \angle A$, $\angle AED = \angle ACB$ b equiangular c $\frac{AD}{AB} = \frac{AE}{AC} = \frac{DE}{BC}$

PAGES 129 & 130 1 D 2 C 3 A 4 B 5 A 6 D 7 C 8 D 9 C 10 A 11 A 12 C 13 D 14 D 15 B

PAGE 131 1 202.80 2 15.625 3 $1\frac{8}{25}$ 4 \$117.36 5 49 6 5:8 7 $125a^9$ 8 $\frac{4m}{5}$ 9 $-a - 2b$ 10 a 11 $y + 3$

12 $\frac{1}{4}$ 13 $\frac{1}{9}$ 14 x^{12} 15 143.11

PAGE 132 1 a $19a$ b $21axy + 30xy$ c $\frac{10n}{3}$ d $243x^{15}y^{10}$ e $2x^3y^2z$ 2 a \$718.76 b \$1080 c \$120 d 80% e \$19.20

3 a $2m + 2n$; mn b $x + 2y + 3z$; xy c $P = S - C$ 4 a $\frac{4x}{5}$ b 0 c $\frac{a^2}{10}$ d $\frac{8m^2}{35}$ e $\frac{4}{3}x^5y^2$

Answers

PAGE 112 1 $\frac{1}{4}$ 2 a $\frac{4}{11}$ b $\frac{4}{11}$ c $\frac{7}{11}$ d $\frac{3}{11}$ 3 a $\frac{1}{2}$ b 0 c $\frac{1}{3}$ 4 a $\frac{4}{7}$ b $\frac{3}{7}$ c $\frac{1}{7}$ d $\frac{2}{7}$ e $\frac{4}{7}$ 5 a $\frac{2}{5}$ b $\frac{4}{15}$

c 0 d $\frac{1}{3}$ e 1 f $\frac{3}{5}$

PAGES 113 & 114 1 C 2 C 3 C 4 B 5 C 6 D 7 B 8 D 9 D 10 A 11 A 12 C 13 D 14 D 15 C

PAGE 115 1 3.6 2 3 3 3 4 5 5 3 6 3 7 2.88 8 3 9 $\frac{1}{6}$ 10 0 11 $\frac{2}{3}$ 12 $\frac{1}{2}$ 13 $\frac{1}{2}$ 14 $\frac{1}{2}$ 15 $\frac{1}{5}$

PAGE 116 1 a 2 b 6.125 c 2, 2, 3, 5, 6, 8, 11, 12 d 5.5 e 10 2 a 7 b 4 c $\frac{4}{7}$ d $\frac{2}{7}$ e $\frac{5}{7}$ 3 a $\frac{1}{4}$ b $\frac{1}{2}$

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PAGE 117 1 $\triangle ABC$ and $\triangle PML$; $\triangle GHI$ and $\triangle AYZ$; $\triangle MNO$ and $\triangle JKL$; $\triangle VWX$ and $\triangle PRQ$; $\triangle DEF$ and $\triangle SUT$ 2 a i $\angle A$ and $\angle C$; $\angle ADB$ and $\angle CDB$; $\angle ABD$ and $\angle DBC$ ii $AD = DC$; $AB = BC$; $BD = BD$ b i $\angle E = \angle G$, $\angle EHF = \angle GFH$, $\angle EFH = \angle GHF$ ii $EH = FG$, $EF = HG$, $HF = HF$ c i $\angle I = \angle K$, $\angle ILJ = \angle JLK$, $\angle IJL = \angle KJL$ ii $IJ = LK$, $IL = JK$, $LJ = LJ$ d i $\angle P = \angle N$, $\angle PMO = \angle NOM$, $\angle POM = \angle NMO$ ii $MN = PO$, $MP = NO$, $MO = MO$ e i $\angle QTS = \angle QTR$, $\angle S = \angle R$, $\angle SQT = \angle RQT$ ii $QS = QR$, $QT = QT$, $ST = RT$ f i $\angle U = \angle X$, $\angle UUV = \angle XVW$, $\angle UVW = \angle XWV$ ii $UV = XW$, $VW = VW$, $UW = XV$ 3 a $\triangle AOD \cong \triangle BOC$; $\triangle AOB \cong \triangle COD$; $\triangle ADC \cong \triangle ABC$; $\triangle ABD \cong \triangle CBD$ b $\triangle ABC \cong \triangle AED$ and $\triangle ABD \cong \triangle AEC$

PAGE 118 1 a = b three sides c two angles and a side d two sides and the included angle e the hypotenuse and one side 2 a RHS b SAS c AAS d SSS 3 a OC b $OA = OB$ c yes d RHS

PAGE 119 1 a SSS b AAS c AAS 2 a SSS b SAS c RHS d AAS e SSS f SSS

PAGE 120 1 a AAS; $x = 30^\circ$, $y = 60^\circ$ b SAS; $x = 11\text{cm}$, $y = 115^\circ$ 2 a SSS or SAS or RHS b RHS

PAGE 121 1 a \parallel b two angles c same ratio d one angle; the same ratio e congruent 2 a equiangular b equiangular 3 a Two

sides in the same ratio and included angle is equal to included angle. b $\angle A = \angle D$; $\angle B = \angle E$; $\angle C = \angle F$ c $\frac{AB}{DE} = \frac{AC}{DF} = \frac{BC}{EF}$

PAGE 122 1 a true b false c false d false e false f false g false h true 2 a $\frac{3}{12} = \frac{5}{20}$ and $\angle ACB = \angle ECD$ b $\frac{AO}{OC} = \frac{BO}{OD}$

and $\angle AOB = \angle DOC$ 3 $\triangle QSP$, $\triangle PSR$, $\triangle QPR$

PAGE 123 1 a equiangular; $x = 5$ b equiangular; $y = 4$ c equiangular; $m = 20$ d two sides and the included angle; $a = 80$, $x = 5$ 2 a equiangular; $x = 5$ b equiangular; $x = 5$ c equiangular; $y = 9$ d equiangular; $x = 4$

PAGE 124 1 a equiangular b $\frac{x}{3} = \frac{6}{4}$ c $x = 4\frac{1}{2}$ 2 a equiangular b $m = 115$ 3 a equiangular b $y = 45$ 4 a BD

b $\angle A = \angle C$; $\angle ADB = \angle CBD$ c yes d AAS 5 a $AO = CO = BO = DO = 12\text{cm}$ b $\angle BOC$ c SAS

PAGES 125 & 126 1 B 2 A 3 C 4 A 5 B 6 C 7 D 8 C 9 A 10 C 11 C 12 B 13 B 14 A 15 B

PAGE 127 1 $PQ = QS$, $QR = QR$ 2 $\angle PQR = \angle SQR$ 3 $\triangle PQR \cong \triangle SQR$ 4 SAS 5 $OL = ON$; $OM = OM$ 6 $\angle OML = \angle OMN$; $\angle OLM = \angle ONM$; $\angle LOM = \angle NOM$ 7 $\triangle OML \cong \triangle OMN$ 8 RHS 9 $\angle ACB = \angle DCE$; $\angle CAB = \angle CED$; $\angle ABC = \angle CDE$

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PAGE 128 1 $\angle AMB = \angle AMC$, $CM = BM$, $AM = AM$; SAS 2 a $\angle D = \angle B$, $AD = CB$, $AC = AC$; SAS b $\angle BAC = \angle DCA$, $AB \parallel DC$ (alternate angles equal) 3 a $\angle BAP = \angle FEP$, $\angle BPA = \angle FPA$, $BP = FP$; AAS; $\therefore AP = PE$ b parallelogram; diagonals bisect 4 a $\angle ADE = \angle ABC$,

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PAGES 129 & 130 1 D 2 C 3 A 4 B 5 A 6 D 7 C 8 D 9 C 10 A 11 A 12 C 13 D 14 D 15 B

PAGE 131 1 202.80 2 15.625 3 $1\frac{8}{25}$ 4 \$117.36 5 49 6 5:8 7 $125a^9$ 8 $\frac{4m}{5}$ 9 $-a - 2b$ 10 a 11 $y + 3$

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PAGE 132 1 a $19a$ b $21axy + 30xy$ c $\frac{10n}{3}$ d $243x^{15}y^{10}$ e $2x^3y^2z$ 2 a \$718.76 b \$1080 c \$120 d 80% e \$19.20

3 a $2m + 2n$; mn b $x + 2y + 3z$; xy c $P = S - C$ 4 a $\frac{4x}{5}$ b 0 c $\frac{a^2}{10}$ d $\frac{8m^2}{35}$ e $\frac{4}{3}x^5y^2$

Answers

PAGE 112 1 $\frac{1}{4}$ 2 a $\frac{4}{11}$ b $\frac{4}{11}$ c $\frac{7}{11}$ d $\frac{3}{11}$ 3 a $\frac{1}{2}$ b 0 c $\frac{1}{3}$ 4 a $\frac{4}{7}$ b $\frac{3}{7}$ c $\frac{1}{7}$ d $\frac{2}{7}$ e $\frac{4}{7}$ 5 a $\frac{2}{5}$ b $\frac{4}{15}$

c 0 d $\frac{1}{3}$ e 1 f $\frac{3}{5}$

PAGES 113 & 114 1 C 2 C 3 C 4 B 5 C 6 D 7 B 8 D 9 D 10 A 11 A 12 C 13 D 14 D 15 C

PAGE 115 1 3.6 2 3 3 3 4 5 5 3 6 3 7 2.88 8 3 9 $\frac{1}{6}$ 10 0 11 $\frac{2}{3}$ 12 $\frac{1}{2}$ 13 $\frac{1}{2}$ 14 $\frac{1}{2}$ 15 $\frac{1}{5}$

PAGE 116 1 a 2 b 6.125 c 2, 2, 3, 5, 6, 8, 11, 12 d 5.5 e 10 2 a 7 b 4 c $\frac{4}{7}$ d $\frac{2}{7}$ e $\frac{5}{7}$ 3 a $\frac{1}{4}$ b $\frac{1}{2}$

c $\frac{1}{2}$ d $\frac{1}{2}$ e $\frac{1}{4}$ 4 a 5 b 25 c 5 d 30 e 8

PAGE 117 1 $\triangle ABC$ and $\triangle PML$; $\triangle GHI$ and $\triangle AYZ$; $\triangle MNO$ and $\triangle JKL$; $\triangle VWX$ and $\triangle PRQ$; $\triangle DEF$ and $\triangle SUT$ 2 a i $\angle A$ and $\angle C$; $\angle ADB$ and $\angle CDB$; $\angle ABD$ and $\angle DBC$ ii $AD = DC$; $AB = BC$; $BD = BD$ b i $\angle E = \angle G$, $\angle EHF = \angle GFH$, $\angle EFH = \angle GHF$ ii $EH = FG$, $EF = HG$, $HF = HF$ c i $\angle I = \angle K$, $\angle ILJ = \angle JLK$, $\angle IJL = \angle KJL$ ii $IJ = LK$, $IL = JK$, $LJ = LJ$ d i $\angle P = \angle N$, $\angle PMO = \angle NOM$, $\angle POM = \angle NMO$ ii $MN = PO$, $MP = NO$, $MO = MO$ e i $\angle QTS = \angle QTR$, $\angle S = \angle R$, $\angle SQT = \angle RQT$ ii $QS = QR$, $QT = QT$, $ST = RT$ f i $\angle U = \angle X$, $\angle UWV = \angle XVW$, $\angle UVW = \angle XWV$ ii $UV = XW$, $VW = VW$, $UW = XV$ 3 a $\triangle AOD \cong \triangle BOC$; $\triangle AOB \cong \triangle COD$; $\triangle ADC \cong \triangle ABC$; $\triangle ABD \cong \triangle CBD$ b $\triangle ABC \cong \triangle AED$ and $\triangle ABD \cong \triangle AEC$

PAGE 118 1 a = b three sides c two angles and a side d two sides and the included angle e the hypotenuse and one side 2 a RHS b SAS c AAS d SSS 3 a OC b $OA = OB$ c yes d RHS

PAGE 119 1 a SSS b AAS c AAS 2 a SSS b SAS c RHS d AAS e SSS f SSS

PAGE 120 1 a AAS; $x = 30^\circ$, $y = 60^\circ$ b SAS; $x = 11\text{cm}$, $y = 115^\circ$ 2 a SSS or SAS or RHS b RHS

PAGE 121 1 a ||| b two angles c same ratio d one angle; the same ratio e congruent 2 a equiangular b equiangular 3 a Two

sides in the same ratio and included angle is equal to included angle. b $\angle A = \angle D$; $\angle B = \angle E$; $\angle C = \angle F$ c $\frac{AB}{DE} = \frac{AC}{DF} = \frac{BC}{EF}$

PAGE 122 1 a true b false c false d false e false f false g false h true 2 a $\frac{3}{12} = \frac{5}{20}$ and $\angle ACB = \angle ECD$ b $\frac{AO}{OC} = \frac{BO}{OD}$

and $\angle AOB = \angle DOC$ 3 $\triangle QSP$, $\triangle PSR$, $\triangle QPR$

PAGE 123 1 a equiangular; $x = 5$ b equiangular; $y = 4$ c equiangular; $m = 20$ d two sides and the included angle; $a = 80$, $x = 5$ 2 a equiangular; $x = 5$ b equiangular; $x = 5$ c equiangular; $y = 9$ d equiangular; $x = 4$

PAGE 124 1 a equiangular b $\frac{x}{3} = \frac{6}{4}$ c $x = 4\frac{1}{2}$ 2 a equiangular b $m = 115$ 3 a equiangular b $y = 45$ 4 a BD

b $\angle A = \angle C$; $\angle ADB = \angle CBD$ c yes d AAS 5 a $AO = CO = BO = DO = 12\text{cm}$ b $\angle BOC$ c SAS

PAGES 125 & 126 1 B 2 A 3 C 4 A 5 B 6 C 7 D 8 C 9 A 10 C 11 C 12 B 13 B 14 A 15 B

PAGE 127 1 $PQ = QS$, $QR = QR$ 2 $\angle PQR = \angle SQR$ 3 $\triangle PQR \cong \triangle SQR$ 4 SAS 5 $OL = ON$; $OM = OM$ 6 $\angle OML = \angle OMN$; $\angle OLM = \angle ONM$; $\angle LOM = \angle NOM$ 7 $\triangle OML \cong \triangle OMN$ 8 RHS 9 $\angle ACB = \angle DCE$; $\angle CAB = \angle CED$; $\angle ABC = \angle CDE$

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PAGE 128 1 $\angle AMB = \angle AMC$, $CM = BM$, $AM = AM$; SAS 2 a $\angle D = \angle B$, $AD = CB$, $AC = AC$; SAS b $\angle BAC = \angle DCA$, $AB \parallel DC$ (alternate angles equal) 3 a $\angle BAP = \angle FEP$, $\angle BPA = \angle FPA$, $BP = FP$; AAS; $\therefore AP = PE$ b parallelogram; diagonals bisect 4 a $\angle ADE = \angle ABC$,

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PAGES 129 & 130 1 D 2 C 3 A 4 B 5 A 6 D 7 C 8 D 9 C 10 A 11 A 12 C 13 D 14 D 15 B

PAGE 131 1 202.80 2 15.625 3 $1\frac{8}{25}$ 4 \$117.36 5 49 6 5:8 7 $125a^9$ 8 $\frac{4m}{5}$ 9 $-a - 2b$ 10 a 11 $y + 3$

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Answers

PAGE 112 1 $\frac{1}{4}$ 2 a $\frac{4}{11}$ b $\frac{4}{11}$ c $\frac{7}{11}$ d $\frac{3}{11}$ 3 a $\frac{1}{2}$ b 0 c $\frac{1}{3}$ 4 a $\frac{4}{7}$ b $\frac{3}{7}$ c $\frac{1}{7}$ d $\frac{2}{7}$ e $\frac{4}{7}$ 5 a $\frac{2}{5}$ b $\frac{4}{15}$

c 0 d $\frac{1}{3}$ e 1 f $\frac{3}{5}$

PAGES 113 & 114 1 C 2 C 3 C 4 B 5 C 6 D 7 B 8 D 9 D 10 A 11 A 12 C 13 D 14 D 15 C

PAGE 115 1 3.6 2 3 3 3 4 5 5 3 6 3 7 2.88 8 3 9 $\frac{1}{6}$ 10 0 11 $\frac{2}{3}$ 12 $\frac{1}{2}$ 13 $\frac{1}{2}$ 14 $\frac{1}{2}$ 15 $\frac{1}{5}$

PAGE 116 1 a 2 b 6, 125 c 2, 2, 3, 5, 6, 8, 11, 12 d 5.5 e 10 2 a 7 b 4 c $\frac{4}{7}$ d $\frac{2}{7}$ e $\frac{5}{7}$ 3 a $\frac{1}{4}$ b $\frac{1}{2}$

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PAGE 117 1 $\triangle ABC$ and $\triangle PML$; $\triangle GHI$ and $\triangle AYZ$; $\triangle MNO$ and $\triangle JKL$; $\triangle VWX$ and $\triangle PRQ$; $\triangle DEF$ and $\triangle SUT$ 2 a i $\angle A$ and $\angle C$; $\angle ADB$ and $\angle CDB$; $\angle ABD$ and $\angle DBC$ ii $AD = DC$; $AB = BC$; $BD = BD$ b i $\angle E = \angle G$, $\angle EHF = \angle GFH$, $\angle EFH = \angle GHF$ ii $EH = FG$, $EF = HG$, $HF = HF$ c i $\angle I = \angle K$, $\angle ILJ = \angle JLK$, $\angle IJL = \angle KJL$ ii $IJ = LK$, $IL = JK$, $LJ = LJ$ d i $\angle P = \angle N$, $\angle PMO = \angle NOM$, $\angle POM = \angle NMO$ ii $MN = PO$, $MP = NO$, $MO = MO$ e i $\angle QTS = \angle QTR$, $\angle S = \angle R$, $\angle SQT = \angle RQT$ ii $QS = QR$, $QT = QT$, $ST = RT$ f i $\angle U = \angle X$, $\angle UWV = \angle XWV$, $\angle UVW = \angle XWV$ ii $UV = XW$, $VW = VW$, $UW = XV$ 3 a $\triangle AOD \cong \triangle BOC$; $\triangle AOB \cong \triangle COD$; $\triangle ADC \cong \triangle ABC$; $\triangle ABD \cong \triangle CBD$ b $\triangle ABC \cong \triangle AED$ and $\triangle ABD \cong \triangle AEC$

PAGE 118 1 a = b three sides c two angles and a side d two sides and the included angle e the hypotenuse and one side 2 a RHS b SAS c AAS d SSS 3 a OC b $OA = OB$ c yes d RHS

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PAGE 122 1 a true b false c false d false e false f false g false h true 2 a $\frac{3}{12} = \frac{5}{20}$ and $\angle ACB = \angle ECD$ b $\frac{AO}{OC} = \frac{BO}{OD}$ and $\angle AOB = \angle DOC$ 3 $\triangle QSP$, $\triangle PSR$, $\triangle QPR$

PAGE 123 1 a equiangular; $x = 5$ b equiangular; $y = 4$ c equiangular; $m = 20$ d two sides and the included angle; $a = 80$, $x = 5$ 2 a equiangular; $x = 5$ b equiangular; $x = 5$ c equiangular; $y = 9$ d equiangular; $x = 4$

PAGE 124 1 a equiangular b $\frac{x}{3} = \frac{6}{4}$ c $x = 4\frac{1}{2}$ 2 a equiangular b $m = 115$ 3 a equiangular b $y = 45$ 4 a BD b $\angle A = \angle C$; $\angle ADB = \angle CBD$ c yes d AAS 5 a $AO = CO = BO = DO = 12\text{cm}$ b $\angle BOC$ c SAS

PAGES 125 & 126 1 B 2 A 3 C 4 A 5 B 6 C 7 D 8 C 9 A 10 C 11 C 12 B 13 B 14 A 15 B

PAGE 127 1 $PQ = QS$, $QR = QR$ 2 $\angle PQR = \angle SQR$ 3 $\triangle PQR \cong \triangle SQR$ 4 SAS 5 $OL = ON$; $OM = OM$ 6 $\angle OML = \angle OMN$; $\angle OLM = \angle ONM$; $\angle LOM = \angle NOM$ 7 $\triangle OML \cong \triangle OMN$ 8 RHS 9 $\angle ACB = \angle DCE$; $\angle CAB = \angle CED$; $\angle ABC = \angle CDE$

10 $\frac{5}{25}$, $\frac{3}{15}$, $\frac{4}{20}$ 11 yes 12 yes 13 The sides are in the same ratio, $\frac{AB}{DE} = \frac{AC}{CE} = \frac{BC}{CD} = \frac{1}{5}$ 14 equiangular 15 $x = 25$

PAGE 128 1 $\angle AMB = \angle AMC$, $CM = BM$, $AM = AM$; SAS 2 a $\angle D = \angle B$, $AD = CB$, $AC = AC$; SAS b $\angle BAC = \angle DCA$, $AB \parallel DC$ (alternate angles equal) 3 a $\angle BAP = \angle FEP$, $\angle BPA = \angle FPA$, $BP = FP$; AAS; $\therefore AP = PE$ b parallelogram; diagonals bisect 4 a $\angle ADE = \angle ABC$,

$\angle A = \angle A$, $\angle AED = \angle ACB$ b equiangular c $\frac{AD}{AB} = \frac{AE}{AC} = \frac{DE}{BC}$

PAGES 129 & 130 1 D 2 C 3 A 4 B 5 A 6 D 7 C 8 D 9 C 10 A 11 A 12 C 13 D 14 D 15 B

PAGE 131 1 202.80 2 15.625 3 $1\frac{8}{25}$ 4 \$117.36 5 49 6 5:8 7 $125a^9$ 8 $\frac{4m}{5}$ 9 $-a - 2b$ 10 a 11 $y + 3$

12 $\frac{1}{4}$ 13 $\frac{1}{9}$ 14 x^{12} 15 143.11

PAGE 132 1 a $19a$ b $21axy + 30xy$ c $\frac{10n}{3}$ d $243x^{15}y^{10}$ e $2x^3y^2z$ 2 a \$718.76 b \$1080 c \$120 d 80% e \$19.20

3 a $2m + 2n$; mn b $x + 2y + 3z$; xy c $P = S - C$ 4 a $\frac{4x}{5}$ b 0 c $\frac{a^2}{10}$ d $\frac{8m^2}{35}$ e $\frac{4}{3}x^5y^2$

Answers

PAGE 112 1 $\frac{1}{4}$ 2 a $\frac{4}{11}$ b $\frac{4}{11}$ c $\frac{7}{11}$ d $\frac{3}{11}$ 3 a $\frac{1}{2}$ b 0 c $\frac{1}{3}$ 4 a $\frac{4}{7}$ b $\frac{3}{7}$ c $\frac{1}{7}$ d $\frac{2}{7}$ e $\frac{4}{7}$ 5 a $\frac{2}{5}$ b $\frac{4}{15}$

c 0 d $\frac{1}{3}$ e 1 f $\frac{3}{5}$

PAGES 113 & 114 1 C 2 C 3 C 4 B 5 C 6 D 7 B 8 D 9 D 10 A 11 A 12 C 13 D 14 D 15 C

PAGE 115 1 3.6 2 3 3 3 4 5 5 3 6 3 7 2.88 8 3 9 $\frac{1}{6}$ 10.0 11 $\frac{2}{3}$ 12 $\frac{1}{2}$ 13 $\frac{1}{2}$ 14 $\frac{1}{2}$ 15 $\frac{1}{5}$

PAGE 116 1 a 2 b 6.125 c 2, 2, 3, 5, 6, 8, 11, 12 d 5.5 e 10 2 a 7 b 4 c $\frac{4}{7}$ d $\frac{2}{7}$ e $\frac{5}{7}$ 3 a $\frac{1}{4}$ b $\frac{1}{2}$

c $\frac{1}{2}$ d $\frac{1}{2}$ e $\frac{1}{4}$ 4 a 5 b 25 c 5 d 30 e 8

PAGE 117 1 $\triangle ABC$ and $\triangle PML$; $\triangle GHI$ and $\triangle AYZ$; $\triangle MNO$ and $\triangle JKL$; $\triangle VWX$ and $\triangle PRQ$; $\triangle DEF$ and $\triangle SUT$ 2 a i $\angle A$ and $\angle C$; $\angle ADB$ and $\angle CDB$; $\angle ABD$ and $\angle DBC$ ii $AD = DC$; $AB = BC$; $BD = BD$ b i $\angle E = \angle G$, $\angle EHF = \angle GFH$, $\angle EFH = \angle GHF$ ii $EH = FG$, $EF = HG$, $HF = HF$ c i $\angle I = \angle K$, $\angle ILJ = \angle JLK$, $\angle IJL = \angle KJL$ ii $IJ = LK$, $IL = JK$, $LJ = LJ$ d i $\angle P = \angle N$, $\angle PMO = \angle NOM$, $\angle POM = \angle NMO$ ii $MN = PO$, $MP = NO$, $MO = MO$ e i $\angle QTS = \angle QTR$, $\angle S = \angle R$, $\angle SQT = \angle RQT$ ii $QS = QR$, $QT = QT$, $ST = RT$ f i $\angle U = \angle X$, $\angle UWV = \angle XWV$, $\angle UVW = \angle XWV$ ii $UV = XW$, $VW = VW$, $UW = XV$ 3 a $\triangle AOD \cong \triangle BOC$; $\triangle AOB \cong \triangle COD$; $\triangle ADC \cong \triangle ABC$; $\triangle ABD \cong \triangle CBD$ b $\triangle ABC \cong \triangle AED$ and $\triangle ABD \cong \triangle AEC$

PAGE 118 1 a = b three sides c two angles and a side d two sides and the included angle e the hypotenuse and one side 2 a RHS b SAS c AAS d SSS 3 a OC b $OA = OB$ c yes d RHS

PAGE 119 1 a SSS b AAS c AAS 2 a SSS b SAS c RHS d AAS e SSS f SSS

PAGE 120 1 a AAS; $x = 30^\circ$, $y = 60^\circ$ b SAS; $x = 11\text{cm}$, $y = 115^\circ$ 2 a SSS or SAS or RHS b RHS

PAGE 121 1 a \parallel b two angles c same ratio d one angle; the same ratio e congruent 2 a equiangular b equiangular 3 a Two

sides in the same ratio and included angle is equal to included angle. b $\angle A = \angle D$; $\angle B = \angle E$; $\angle C = \angle F$ c $\frac{AB}{DE} = \frac{AC}{DF} = \frac{BC}{EF}$

PAGE 122 1 a true b false c false d false e false f false g false h true 2 a $\frac{3}{12} = \frac{5}{20}$ and $\angle ACB = \angle ECD$ b $\frac{AO}{OC} = \frac{BO}{OD}$

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b $\angle A = \angle C$; $\angle ADB = \angle CBD$ c yes d AAS 5 a $AO = CO = BO = DO = 12\text{cm}$ b $\angle BOC$ c SAS

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$\angle A = \angle A$, $\angle AED = \angle ACB$ b equiangular c $\frac{AD}{AB} = \frac{AE}{AC} = \frac{DE}{BC}$

PAGES 129 & 130 1 D 2 C 3 A 4 B 5 A 6 D 7 C 8 D 9 C 10 A 11 A 12 C 13 D 14 D 15 B

PAGE 131 1 202.80 2 15.625 3 $1\frac{8}{25}$ 4 \$117.36 5 49 6 5:8 7 $125a^3$ 8 $\frac{4m}{5}$ 9 $-a - 2b$ 10 a 11 $y + 3$

12 $\frac{1}{4}$ 13 $\frac{1}{9}$ 14 x^{12} 15 143.11

PAGE 132 1 a $19a$ b $21axy + 30xy$ c $\frac{10n}{3}$ d $243x^{15}y^{10}$ e $2x^3y^2z$ 2 a \$718.76 b \$1080 c \$120 d 80% e \$19.20

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