Year 10 Term 2 Homework

Student Name: _____	**Grade**: _____
Date: _____	**Score**: _____

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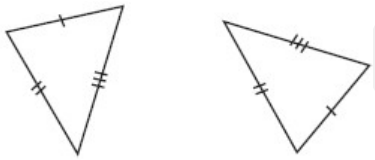
1 Year 10 Term 2 Week 1 Homework

1.1 Deductive geometry

1.1.1 Congruent triangles

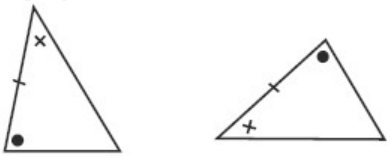
If two triangles are congruent, then:

- the matching sides are equal in length.
- the matching angles are equal in size.
- the figures are equal in area.
- If three sides of one triangle are equal to the three sides of another triangle, then the two triangles are congruent (SSS).

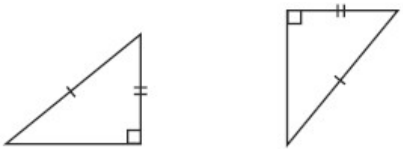


- If two sides and the included angle of one of triangle are equal to two sides and the included angle of another triangle, then the two triangles are congruent (**SAS**).

- If two angles and one side of one triangle are equal to two angles and the matching side of another triangle, then the two triangles are congruent (**AAS**).



- If the hypotenuse and a second side of one right-angled triangle are equal to the hypotenuse and a second of another right-angled triangle, then the two triangles are congruent(**RHS**).

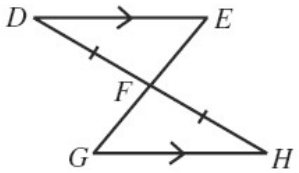


To prove that two triangles are congruent:

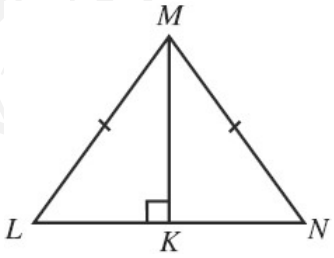
- Identify the triangles that are being used in the proof and name the three pairs of equal sides or angles.
- Name the congruent triangles, giving the vertices of the triangles in the matching order, and state the congruence test used.

Exercise 1.1.1

1. *Prove that* $\triangle DEF \equiv \triangle HGF$.

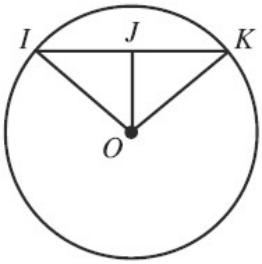


2. *Prove that* $\triangle MLK \equiv \triangle MNK$.

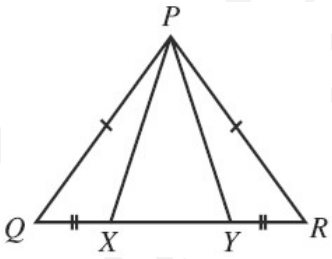


Exercise 1.1.2

1. *O is the centre of the circle and $OJ \perp IK$. Prove that OJ bisects $\angle IOK$.*



2. *In the isosceles triangle PQR, $PQ = PR$. $QX = RY$.*

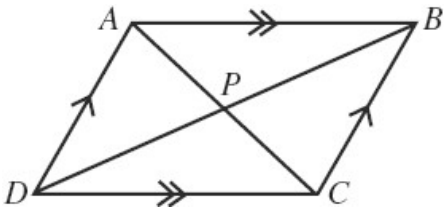


   (a) *Prove that $\triangle PQX \equiv \triangle PRY$.*

   (b) *Hence, show that $\triangle PXY$ is isosceles.*

1.2 Deductive proofs involving quadrilaterals

Exercise 1.2.1 ABCD is a parallelogram. The diagonals AC and BD meet at P.

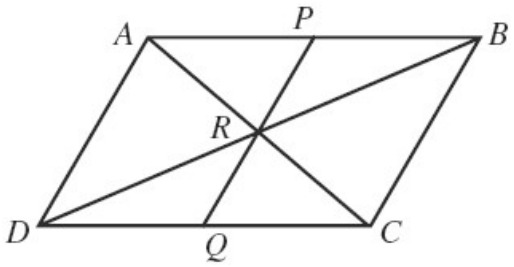


1. *Prove that* $\triangle APB \equiv \triangle CPD$.

2. *Hence show that* $AP = PC$ *and* $DP = PB$.

3. *What property of a parallelogram have you proven?*

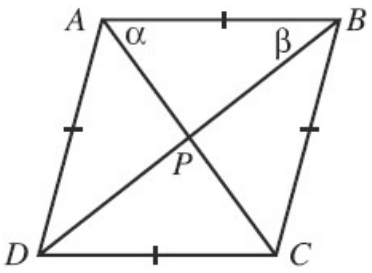
Exercise 1.2.2 ABCD is a parallelogram. The diagonals AC and BD meet at R. A line PQ is drawn through R, where P lies on AB and Q lies on DC.



1. *Prove that* $\triangle BPR \equiv \triangle DQR$.

2. *Hence show that* $PB = DQ$ *and* $AP = QC$.

Exercise 1.2.3 ABCD is a rhombus. The diagonals AC and BD meet at P. Let $\angle CAB = \alpha$ and $\angle ABD = \beta$.

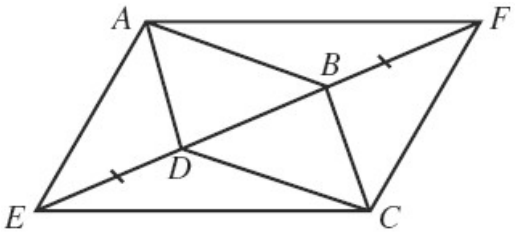


1. *Explain why $\angle BCA = \alpha$ and $\angle CBD = \beta$.*

2. *Find the value of $\alpha + \beta$.*

3. *Hence, explain why $AC \perp BD$.*

Exercise 1.2.4 ABCD is a parallelogram. BD is produced to E and DB is produced to F such that $DE = BF$.



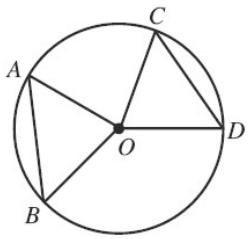
1. *Show that $\angle FBC = \angle ADE$.*

2. *Prove that $\triangle FBC \equiv \triangle EDA$.*

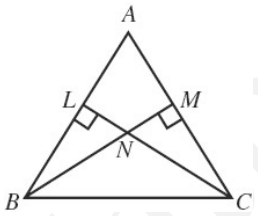
3. *Hence prove that AFCE is a parallelogram.*

1.3 Miscellaneous exercises

Exercise 1.3.1 O is the centre of the circle an $AB = CD$. Prove that $\angle AOB = \angle COD$.



Exercise 1.3.2 In the isosceles triangle ABC. AB = AC. $CL \perp AB$ and $BM \perp AC$.



1. *Prove that $\triangle BLC \equiv \triangle CMB$.*

2. *Prove that $\triangle BLN \equiv \triangle CMN$.*

3. *Hence show that $LN = MN$*

Exercise 1.3.3

1. *The length of a rectangle is 8 cm greater than its breadth. If the area of the rectangle is 345cm^2, find the perimeter of the rectangle.*

2. *The product of two positive integers is 112 and the larger number is 6 more than the smaller number. Find the numbers.*

3. *Solve the following equations, giving the solutions correct to 2 decimal places where necessary.*

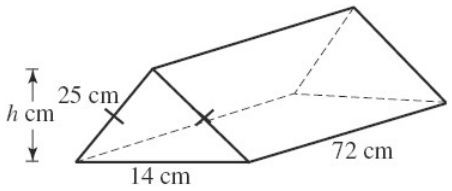
   (a) $x^2 - 25 = 2x + 10$

   (b) $x + \frac{16}{x} = 8$

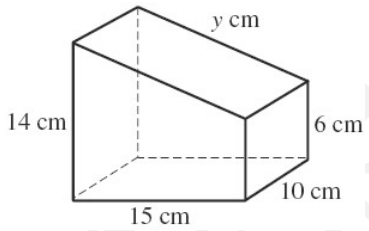
   (c) $\frac{3}{x} - \frac{7x}{2} = 4$

Exercise 1.3.4

1. *Find the value of the pronumeral in the figure. Hence calculate the surface area.*



2. *Find the value of the pronumeral in the figure. Hence calculate the surface area.*



3. *Find the surface area and the volume of the figure shown below:*