**Lines, Angles and Shapes (F)**

Intervention Booklet

Name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

Class: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**Useful websites:**

**www.mathswatchvle.com**

*(Video explanations and questions)*

Centre ID: twgash

Username: firstname

Password: lastname

**www.methodmaths.com**

*(Past papers online that get instantly marked)*

Centre ID: wga

Username: firstname

Password: lastname

**www.hegartymaths.com**

*(Online tutorials and quizzes)*

Login: first name and last name are backwards and case sensitive

**www.bbc.co.uk/schools/gcsebitesize/maths**

**Angles in triangles, on a line and around a point**

**Things to remember:**

* Angles in a triangle sum to 180°.
* Angles on a line sum to 180°.
* Angles around a point sum to 360°.

**Questions:**

**1.** XYW is a straight line.

Work out the size of the angle marked a.

You must give reasons for your answer.

**(Total for Question is 4 marks)**



**2.** DAC, FCB and ABE are straight lines.

Work out the size of the angle marked x.

You must give reasons for your answer.

**(Total for Question is 5 marks)**

**3.** ABC is a straight line.

AB = BD

Angle BAD = 25°

Angle BCD = 70°

Work out the size of the angle marked x.

Give reasons for your answer.

**(Total for Question is 4 marks)**



**4.** WXYZ is a quadrilateral.

XYV is a straight line.

(a) (i) Find the

size of the angle marked a.

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(ii) Give a reason for your answer.

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**(2)**

Angle ZWX = angle WXY

(b) Work out the size of angle ZWX.

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 **(2)**

 **(Total for question = 4 marks)**

**Angles in parallel lines**

Things to remember:

  

C-shape co-interior F-shaped corresponding Z-shaped alternate

angles add up to 180° angles are equal angles are equal

**Questions:**

**1.** Diagram not drawn accurately.
*ABC*, *DEF* and *PQRS* are parallel lines.
*BEQ* is a straight line.

Angle *ABE* = 60°
Angle *QER* = 80°

Work out the size of the angle marked *x*.
Give reasons for each stage of your working.

**(Total for question = 4 marks)**



**2.** Diagram not drawn accurately.

 ABCD and EFG are parallel lines.

BC = CF

Angle BFE = 70°

Work out the size of the angle marked x.

Give reasons for each stage of your working.

**(Total for question = 4 marks)**

**3.** Diagram NOT accurately drawn

PRS and TWY are parallel straight lines.

QRWZ is a straight line.

Work out the value of x.

Give reasons for your answer.

**(Total for question = 3 marks)**

**4.** ABC is a straight line.

DEFG is a straight line.

AC is parallel to DG.

EF = BF.

Angle BEF = 50°.

Work out the size of the angle marked x.

Give reasons for your answer.

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**(Total for Question is 4 marks)**

**5.** CDEF is a straight line.

AB is parallel to CF.

DE = AE.

Work out the size of the angle marked x.

You must give reasons for your answer.

**(Total for Question is 4 marks)**

**6.** ABCD is a parallelogram.

 Angle ADB = 38°.

 Angle BEC = 41°.

 Angle DAB = 120°.

 Calculate the size of angle x.

You must give reasons for your answer.

**(Total for Question is 4 marks)**

**7.** ABC, PQR and AQD are straight lines.

ABC is parallel to PQR.

 Angle BAQ = 35°

 Angle BQA = 90°

 Work out the size of the angle marked x.

 Give reasons for each stage of your working.

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 **(Total for Question is 4 marks)**

**8.** Diagram NOT accurately drawn

ABC and DEF are parallel lines.

BEG is a straight line.

Angle GEF = 47°.

Work out the size of the angle marked x.

Give reasons for your answer.

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 **(Total for Question is 3 marks)**

**Interior and exterior angles**

**Things to remember:**

* Interior Angles:
	+ For n sides, the sum of interior angles = (n – 2) x 180
	+ Each interior angle = (n – 2) x 180

n

* Exterior Angles:
	+ The sum of exterior angles in any shape (or polygon) is 360°

**Questions:**

**1.** The diagram shows three sides of a regular polygon.

The size of each exterior angle of the regular polygon is x°.

The size of each interior angle of the regular polygon is 8x°.

Work out the number of sides the regular polygon has.

………………………………………

**(Total for question = 3 marks)**

**2.** ABCDEFGH is a regular octagon.

KLQFP and MNREQ are two identical regular pentagons.

Work out the size of the angle marked x.

You must show all your working.

………………………………………°

**(Total for question = 4 marks)**

**3.** Diagram not drawn accurately.

 ABCDE is a regular pentagon.

ACFG is a square.

Work out the size of angle DCF.

You must show all your working.

………………………………………°

**(Total for question = 4 marks)**

**4.** ABCDE is a regular pentagon.

BCF and EDF are straight lines.

Work out the size of angle CFD.

You must show how you got your answer.

………………………………………°

**(Total for question = 3 marks)**

**5.** Diagram not drawn accurately.

ABCDEFGH is a regular octagon.

BCKFGJ is a hexagon.

JK is a line of symmetry of the hexagon.

Angle BJG = angle CKF = 140°

Work out the size of angle KFE.

You must show all your working.

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**(Total for Question is 4 marks)**



**6.** Diagram not drawn accurately .

ABCDE is a regular polygon.

EB is a straight line.

Angle EBC = 72°.

Work out the size of the angle marked x.

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**(Total for question = 3 marks)**

**7.** The diagram shows a square and 4 regular pentagons.

Work out the size of the angle marked x.

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**(Total for question = 3 marks)**

**8.** The diagram shows two regular shapes.

Work out the size of the angle marked x.

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 **(Total for Question is 3 marks)**

**Proofs of congruence and similarity**

**Things to remember:**

* To prove congruence, look for:
	+ Side, angle, side
	+ Angle, side, angle
	+ Side, side, side, or
	+ Right-angle, hypotenuse, (other) side

**Questions:**

**1.** These shapes have been drawn on a grid of centimetre squares.



(a) (i) Write down the letters of a pair of shapes that are congruent.

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(ii) Write down the letters of a different pair of shapes that are similar.

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**(2)**

(b) Find the perimeter of shape D.

       .......................................................................................................................................

**(1)**

**(Total for Question is 3 marks)**

**2.** Here are some triangles drawn on a grid.



Two of these triangles are congruent.

(a) Write down the letters of these triangles.

.............................. and ..............................

**(1)**

One of the triangles is similar to triangle **B**.

(b) Write down the letter of this triangle.

..............................

**(1)**

 **(Total for Question is 2 marks)**

**3.** Diagram not drawn accurately.

In the diagram,

*ADE* is a right-angled triangle,

*ABCD* and *AEFG* are squares.

Prove that triangle *ABE* is congruent to triangle *ADG*.

**(Total for Question is 3 marks)**

**4.** *ABCD* is a rhombus.

*M* and *N* are points on *BD* such that *DN* = *MB*.

Prove that triangle *DNC* is congruent to triangle *BMC*.

**(Total for question = 3 marks)**

**5.** *ABCD* is a parallelogram.

*E* is the point where the diagonals *AC* and *BD* meet.

Prove that triangle *ABE* is congruent to triangle *CDE*.

**(Total for question = 3 marks)**

**6.** *PQ* = *PR*.
*S* is the midpoint of *PQ*.
*T* is the midpoint of *PR*.

Prove triangle *QTR* is congruent to triangle *RSQ*.

**(Total for question is 3 marks)**