

## Year 10 Term 1 Homework

<b>Student Name:</b> _____	<b>Grade:</b> _____
<b>Date:</b> _____	<b>Score:</b> _____

### Table of contents

<b>10 Year 10 Term 1 Week 10 Homework</b>	<b>1</b>
10.1 Deductive geometry . . . . .	1
10.1.1 Basic properties of geometry . . . . .	1
10.1.2 Polygons . . . . .	2
10.1.3 Deductive proofs involving angles . . . . .	3
10.2 Miscellaneous exercises . . . . .	4

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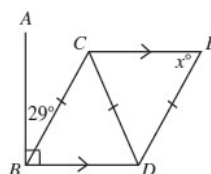
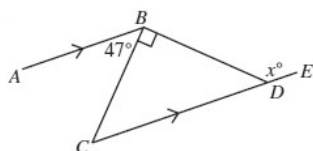
## 10 Year 10 Term 1 Week 10 Homework

### 10.1 Deductive geometry

#### 10.1.1 Basic properties of geometry

- Adjacent angles:
  - have a common vertex
  - have a common ray
  - lie on opposite sides of this common ray.
- Complementary angles have a sum of  $90^\circ$ .
- Supplementary angles have a sum of  $180^\circ$ .
- Angles at a point have a sum of  $360^\circ$ .
- Vertically opposite angles are equal.
- Parallel lines:
- Angle sum of a triangle is  $180^\circ$ .
- The exterior angle of a triangle is equal to the sum of the two interior opposite angles.
- Some other properties of triangles:
  - In an equilateral triangle all angles are  $60^\circ$
  - In an isosceles triangle, the equal angles are opposite the equal sides.
  - In any triangle, the longest side is opposite the largest angle and the shortest side is opposite the smallest angle.
- The angle sum of a quadrilateral is  $360^\circ$

**Exercise 10.1.1** Find the value of  $x$  in each of these, giving reasons.



**10.1.2 Polygons**

- The sum  $S$  of the interior angles of any  $n$ -sided polygon is given by  $S = (n - 2)^\circ$
- The sum  $S$  of the exterior angles of any convex polygon is  $360^\circ$
- In any regular  $n$ -sided convex polygon:
  - each interior angle measures  $\frac{180^\circ(n-2)}{n}$
  - each exterior angle measures  $\frac{360^\circ}{n}$

**Exercise 10.1.2 How many sides have each polygon?**

1. *decagon* \_\_\_\_\_
2. *nonagon* \_\_\_\_\_
3. *dodecagon* \_\_\_\_\_
4. *heptagon* \_\_\_\_\_
5. *undecagon* \_\_\_\_\_

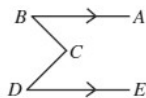
**Exercise 10.1.3 Find the sizes of the interior and exterior angles of the following regular polygons:**

1. *hexagon* \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_
2. *pentagon* \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_
3. *dodecagon* \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

**10.1.3 Deductive proofs involving angles**

**Exercise 10.1.4**

1. Given that  $BA \parallel DE$ . Prove that  $\angle BCD = \angle ABC + \angle CDE$ .

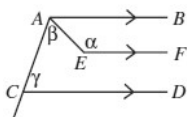



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2. Given that  $AB \parallel CD \parallel EF$ . Prove that  $\alpha = \beta + \gamma$ .




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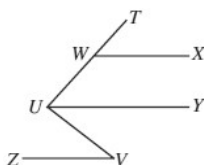


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3.  $WX \parallel UY \parallel ZV$  and  $UY$  bisects  $\angle TUV$ . Prove that  $\angle TWX = \angle UVZ$




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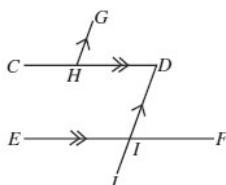


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4.  $CD \parallel EF$  and  $GH \parallel DJ$ . Prove that  $\angle CHG = \angle JIF$ .




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### 10.2 Miscellaneous exercises

**Exercise 10.2.1** Find the interior angle sum of a regular polygon that has:

1. exterior angles measuring  $72^\circ$ .

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2. interior angles measuring  $156^\circ$ .

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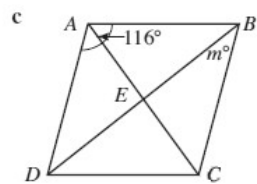
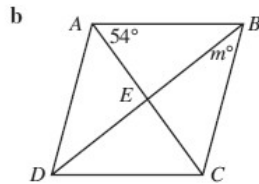
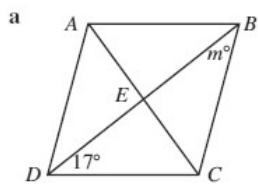


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**Exercise 10.2.2** In each of the following, ABCD is a rhombus. Find the value of  $m$ , giving reasons.




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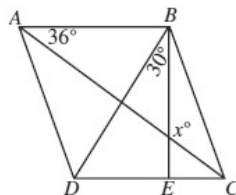


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**Exercise 10.2.3** ABCD is a rhombus.  $\angle DBE = 30^\circ$ .  $\angle BAC = 36^\circ$ . Find the value of  $x$ .




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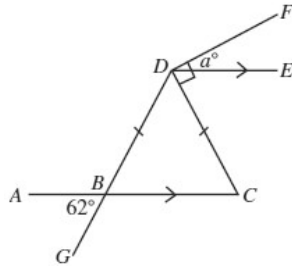
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**Exercise 10.2.4 Find the value of the pronumeral in each of the following, giving reasons:**

1. In the diagram.  $BD = CD$ ,  $DE \parallel AC$  and  $CD \perp DF$ . Find the value of  $a$ .




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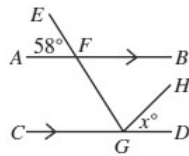


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2. In the diagram,  $AB \parallel CD$  and  $HG$  bisects  $\angle FGD$ . Find the value of  $x$ .




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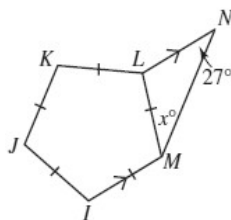


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3. In the diagram  $IJKLM$  is a regular pentagon. find the value of  $x$ .




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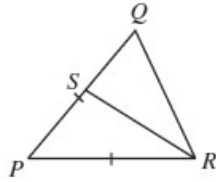
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**Exercise 10.2.5**

1. In  $\triangle PQR$ ,  $PQ = PR$ .  $S$  is point on  $PQ$  such that  $SR$  bisects  $\angle PRQ$ .  
 Prove that  $\angle PSR = 3\angle PRS$ .




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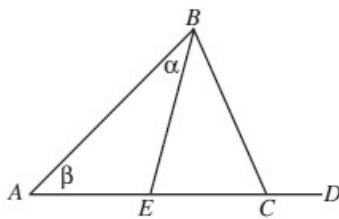


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2. In  $\triangle ABC$ ,  $AC$  is produced to  $D$ .  $E$  is a point on  $AC$  such that  $EB$  bisects  $\angle ABC$ .  
 Let  $\angle ABE = \alpha$  and  $\angle BAC = \beta$ .



- (a) Find the expressions for  $\angle BEC$  and  $\angle BCD$ , giving reasons.

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- (b) Hence, prove that  $\angle BAC + \angle BCD = 2\angle BEC$ .

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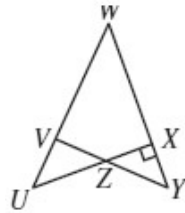
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**Exercise 10.2.6**

1. In the diagram,  $VW = VY$  and  $UX \perp WY$ . Prove that  $\triangle UVZ$  is isosceles.




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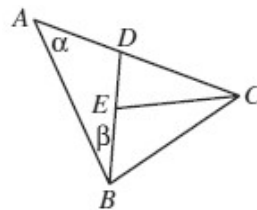


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2. In  $\triangle ABC$ ,  $D$  is a point on  $AC$  such that  $BD$  bisects  $\angle ABC$ .  $E$  is a point on  $BD$  such that  $\angle BCE = \angle BAD$ . Let  $\angle BAC = \alpha$  and  $\angle ABD = \beta$ .



(a) Explain why  $\angle BDC = \alpha + \beta$ .

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(b) Hence, prove that  $CD = CE$ .

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**Exercise 10.2.7** Solve each equation for x:

1.  $x(x - 1)(4x + 1)^2(x^2 + 1) = 0$

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2.  $x^4 - 64 = 0$

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3.  $x^7 - 3x^5 = 0$

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4.  $x^4 - 4x^2 = 5$

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5.  $4 - 2(x - b) = a + 3$

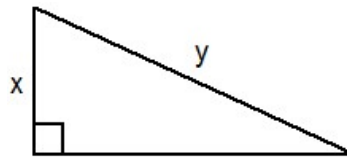
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**Exercise 10.2.8**

1. Find the area of the triangle shown below in terms of  $x$  and  $y$ .



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2. Reduce to lowest terms:  $\frac{2x^2-3x-2}{10+x-3x^2}$

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3. Rationalise the denominator:  $\frac{1}{\sqrt{5}+2}$

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4. Simplify:  $\frac{\frac{1}{x+1} + \frac{1}{x}}{\frac{1}{x+1} - \frac{1}{x}}$

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