Year 10 Term 1 Homework

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

Table of contents

This edition was printed on March 14, 2022 with **Worked Solutions.**
Camera ready copy was prepared with the **LaTeX2e** typesetting system.

10 Year 10 Term 1 Week 10 Homework

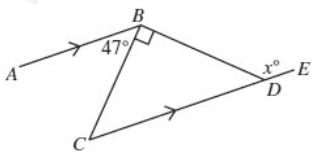
10.1 Deductive geometry

10.1.1 Basic properties of geometry

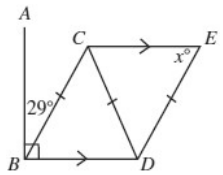
- Adjacent angles:
  - have a common vertex
  - have a common ray
  - lie on opposite sides of this common ray.
- Complementary angles have a sum of $90°$.
- Supplementary angles have a sum of $180°$.
- Angles at a point have a sum of $360°$.
- Vertically opposite angles are equal.
- Parallel lines:
- Angle sum of a triangle is $180°$.
- The exterior angle of a triangle is equal to the sum of the two interior opposite angles.
- Some other properties of triangles:
  - In a equilateral triangle all angles are $60°$
  - 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 $360°$

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

(a)



(b)



10.1.2 Polygons

- The sum S of the interior angles of any n-sided polygon is given by $S = (n-2) \times 180^\circ$
- The sum S of the exterior angles of any convex polygon is 360°
- 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:* _____

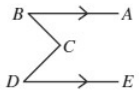
2. *pentagon:* _____

3. *dodecagon:* _____

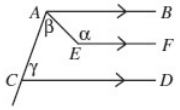
10.1.3 Deductive proofs involving angles

Exercise 10.1.4

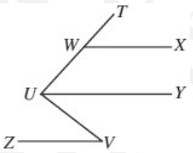
1. *Given that BA || DE. Prove that* $\angle BCD = \angle ABC + \angle CDE$.



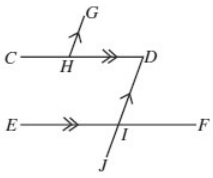
2. *Given that AB || CD || EF. Prove that* $\alpha = \beta + \gamma$.



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



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



10.2 Miscellaneous exercises

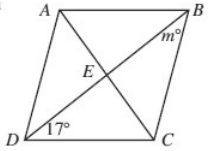
Exercise 10.2.1 Find the interior angle sum of a regular polygon that has:

1. *exterior angles measuring* $72°$.

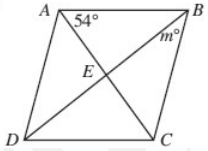
2. *interior angles measuring* $156°$.

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

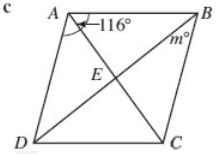
a



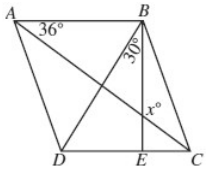
b



c

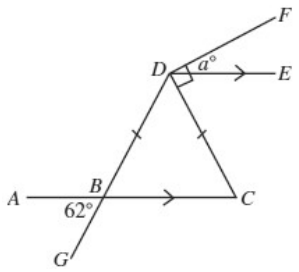


Exercise 10.2.3 ABCD is a rhombus. $\angle DBE = 30°$. $\angle BAC = 36°$. Find the value of x.

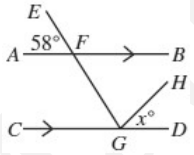


Exercise 10.2.4 Find the value of the pronumeral in each of the following, giving reasons:

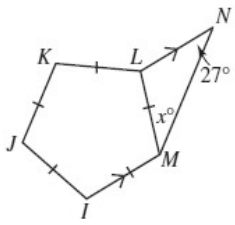
1. *In the diagram. $BD = CD$, $DE||AC$ and $CD \perp DF$. Find the value of a.*



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

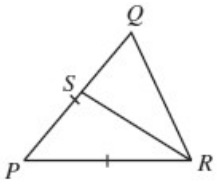


3. *In the diagram IJKLM is a regular pentagon. find the value of x.*

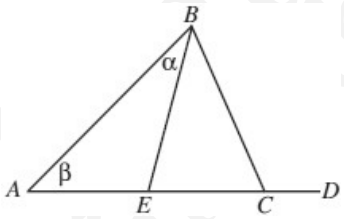


Exercise 10.2.5

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



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 $\angle BAC = \beta$.

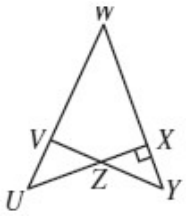


   (a) *Find the expressions for $\angle BEC$ and $\angle BCD$, giving reasons.*

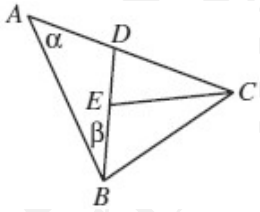
   (b) *Hence, prove that $\angle BAC + \angle BCD = 2\angle BEC$.*

Exercise 10.2.6

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



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 $\angle BDC = \alpha + \beta$.*

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

Exercise 10.2.7 Solve each equation for x:

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

2. $x^4-64=0$

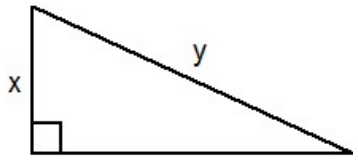
3. $x^7-3x^5=0$

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

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

Exercise 10.2.8

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



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

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

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