Year 9 Term 3 Homework

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

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4 Year 9 Term 3 Week 4 Homework

4.1 Index

4.1.1 The fraction index

Exercise 4.1.1 Write each of these in index form:

1. $x\sqrt{x}$
2. $x^3\sqrt{x}$
3. $x\sqrt[3]{x}$
4. $x^3 \times \sqrt[5]{x}$
5. $\frac{1}{\sqrt[5]{x}}$
6. $\frac{1}{\sqrt[x]{x}}$
7. $\frac{1}{x\times\sqrt[3]{x}}$
8. $\frac{1}{x^2\times\sqrt{x}}$
9. $\frac{1}{x^3\times\sqrt[3]{x}}$

Exercise 4.1.2 Write each of the form $a^m \times \sqrt[n]{a}$, where m and n are positive integers.

1. $a^{\frac{3}{2}}$
2. $a^{\frac{5}{2}}$
3. $a^{\frac{5}{3}}$

Exercise 4.1.3

1. *Which is greater,* $2^{\frac{1}{2}}$ *or* $3^{\frac{1}{3}}$*?*

2. *Which is greater,* $5^{\frac{1}{3}} \times 3^{\frac{1}{2}}$ *or* $9^{\frac{1}{4}} \times 2^{\frac{5}{6}}$*?*

4.2 Geometry

4.2.1 Properties of special quadrilaterals

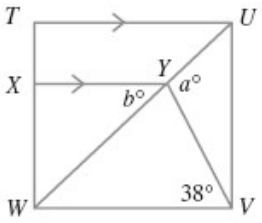
- Square:
  - all sides are equal and all angles are right angles
  - the opposite sides are parallel
  - the diagonals are equal and bisect each other at right angles and the diagonals bisect the angles at the vertices
- Rectangle:
  - the opposite sides are equal
  - all angles are right angles
  - the diagonals are equal and bisect each other
- Parallelogram:
  - the opposite sides are equal and parallel
  - the opposite angles are equal
  - the diagonals bisect each other
- Rhombus:
  - all sides are equal
  - the opposite sides are parallel
  - opposite angles are equal
  - the diagonals bisect each other at right angles and the diagonals bisect the angles at the vertices
- Trapezium: only one pair of opposite sides is parallel
- Kite:
  - two pairs of adjacent sides are equal
  - one pair of opposite angles are equal
  - one diagonal bisect the other at right angles and one diagonal bisect the angles at the vertices

Exercise 4.2.1 State the following statements true of false.

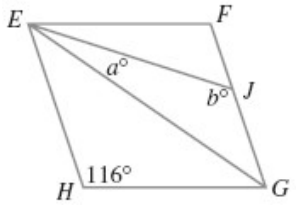
1. *A square is a rectangle.* _____
2. *A parallelogram is a rhombus.* _____
3. *A rhombus is a rectangle.* _____
4. *A rhombus is parallelogram.* _____

Exercise 4.2.2 Find the value of a and b in each of the following:

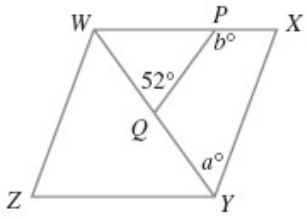
1. *TUVW is a square and TU//XY. Find the value of a and b.*



2. *EFGH is a rhombus, EJ bisects $\angle FEG$. Find the value of a and b.*



3. *WXYZ is a rhombus, WX = WY. Find the value of a and b.*



4.2.2 Polygons

In any regular n-side convex polygon:

- each interior angle measures $\frac{180°(n-2)}{n}$
- each exterior angle measures large $\frac{360°}{n}$

Exercise 4.2.3 Use the formula $\theta = \frac{360}{n}$ to find the size of each exterior angle θ in a regular:

1. *octagon* = _____
2. *nonagon* = _____
3. *dodecagon* = _____

Exercise 4.2.4 How many sides are there in a regular polygon whose exterior each measure:

1. $120°$ = _____
2. $30°$ = _____
3. $12°$ = _____

Exercise 4.2.5 A regular polygon has 24 sides.

1. *Find the size of the exterior angles.*

   _____

   _____

2. *Hence, find the size of the interior angles.*

   _____

   _____

3. *Use your answer in part II to find the angle sum of the polygon.*

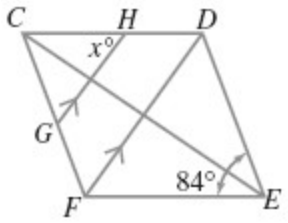
   _____

   _____

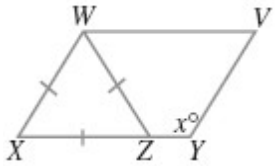
4.2.3 Miscellaneous exercises

Exercise 4.2.6 Further applications:

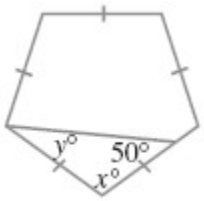
1. *If CDEF is a rhombus, GH//FD, find the value of x.*



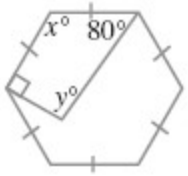
2. *If VWYZ is a parallelogram, $\triangle WXZ$ is a equilateral triangle, find the value of x.*



3. *If the given figure is a regular pentagon, find the value of x and y.*



4. *If the given figure is a regular hexagon, find the value of x and y.*



Exercise 4.2.7 Evaluate each of these if $2^n = 5$

1. 2^{n+2}

2. 2^{2n+2}

3. 2^{2n+4}

Exercise 4.2.8 Evaluate each of these if $5^n = 500$

1. 5^{n-1}

2. 5^{n-2}

3. 5^{2n-4}

Exercise 4.2.9 Simplify the following:

1. $9^{-\frac{1}{2}}$

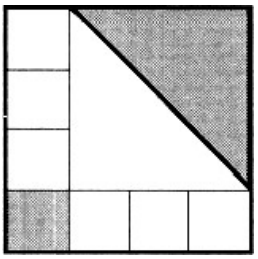
2. $1000^{-\frac{1}{3}}$

3. $32^{-\frac{1}{5}}$

4.3 Math challenge

Exercise 4.3.1

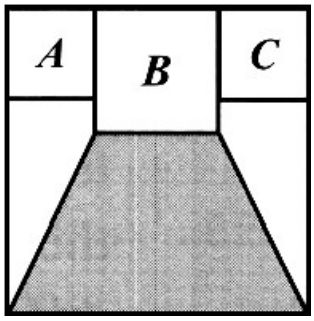
1. *In this diagram, the big square is divided in to 7 congruent small squares and 2 congruent triangles. The area of the shaded square is 5 cm^2. What is the area of the shaded triangle in cm^2?*



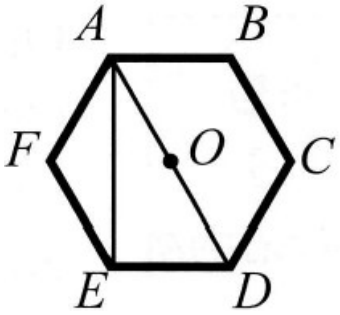
2. *A rectangle is dived into four smaller rectangles whose areas in cm^2 are 35, 42 10 and N, as shown below. The length of each side of every rectangle is a whole number. What is the value of N, in cm^2?*

35	10
42	*N*

3. *The large square shown contains smaller squares A, B and C. Their areas are 16 cm^2, 25 cm^2 and 16 cm^2, respectively. Find the area of the shaded region.*



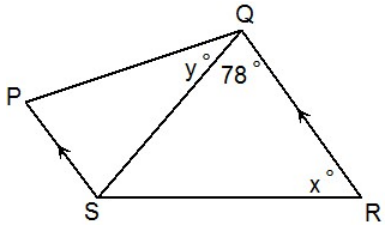
4. *ABCDEF is a regular hexagon whose centre is at point O. If he area of the triangle AED is 16 cm^2, what is the area of hexagon?*



4.4 Miscellaneous exercise

Exercise 4.4.1

1. *In the diagram, $QP = QS = QR$, $\angle SQR = 78^\circ$ and PS is parallel to QR. Find the value of x and y.*



2. *The interior angles of a pentagon are $3x^\circ$, $2x^\circ$, x°, $4x^\circ$ and $5x^\circ$ respectively. Find the value of x.*

3. *Two interior angles of a polygon are 50° and 60°. The rest of the interior angles are x°, $2x^\circ$, $3x^\circ$ and $4x^\circ$. Find the number of sides of the polygon and hence find the value of x.*

4. *Find the number of sides of a regular polygon if each interior is 17 times its exterior angle.*

5. *The exterior angles of a quadrilateral are $2x^\circ$, $3x^\circ$, 95° and 115°. Find the value of x and hence find the largest interior angle.*

Exercise 4.4.2 Solve the following equations:

1. $3x^2 - 75 = 0$

2. $(2x + 1)(x + 2) - 5 = 0$

3. $2x^2 + 5x = 12$

4. $3(x - 1)^2 - 48 = 0$

5. $\frac{3x}{2} = \frac{24}{x}$

6. $\frac{x-2}{x+4} = x$

Exercise 4.4.3 Find the vertex of the following: (vertex of a parabola)

1. $y = (x + 3)(x - 1)$

2. $y = x^2 - 4x + 3$

3. $y = -x^2 - 3x + 6$

4. $y = 2x^2 - 3x + 1$

5. $y = x^2 + 2x - 8$