

## Year 9 Term 3 Homework

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

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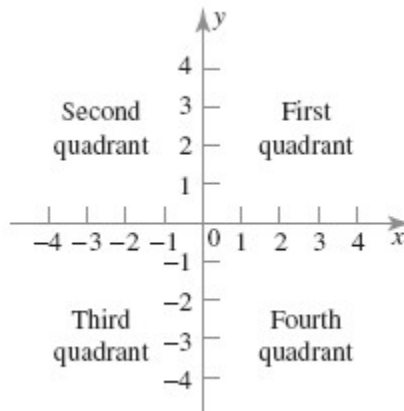
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## 7 Year 9 Term 3 Week 7 Homework

### 7.1 The Linear Function

#### 7.1.1 The number plane

- The number plane shown below is made up of **four quadrants** separated by two perpendicular number lines called axes.
- The horizontal number line is referred to as the **x-axis**
- The vertical number line is referred to as the **y-axis**
- a point is located by a pair of **co-ordinates** (x, y).



#### Exercise 7.1.1 In which quadrant does each point lie?

1.  $(-3, 5) =$  \_\_\_\_\_

2.  $(-2, -3) =$  \_\_\_\_\_

3.  $(3, -2) =$  \_\_\_\_\_

4.  $(9, 8) =$  \_\_\_\_\_

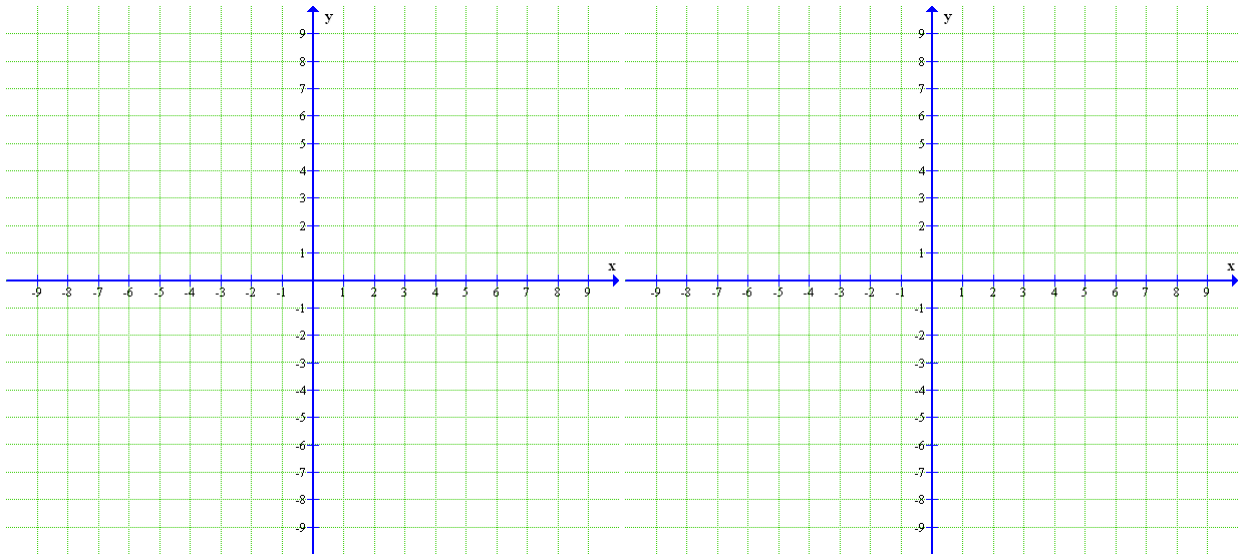
5.  $(-5, 2) =$  \_\_\_\_\_

6.  $(-6, -8) =$  \_\_\_\_\_

7.  $(-7, 6) =$  \_\_\_\_\_

8.  $(5, -5) =$  \_\_\_\_\_

**Exercise 7.1.2** Find the distance between each pair of points: ( $d = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$ )



1.  $(2, 3)$  and  $(5, 9) =$  \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

2.  $(-1, 0)$  and  $(5, 0) =$  \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

3.  $(0, -3)$  and  $(0, 6) =$  \_\_\_\_\_

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\_\_\_\_\_

4.  $(-8, -6)$  and  $(-2, -2) =$  \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

5.  $(3, 8)$  and  $(-2, -8) =$  \_\_\_\_\_

\_\_\_\_\_

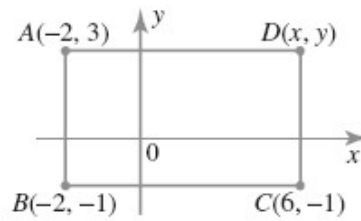
\_\_\_\_\_

6.  $(-3, 8)$  and  $(3, -8) =$  \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

**Exercise 7.1.3** For the figure given below:



1. Find the co-ordinate of  $D$  in the first quadrant such that  $ABCD$  is a rectangle.

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2. Find the perimeter of  $ABCD$ .

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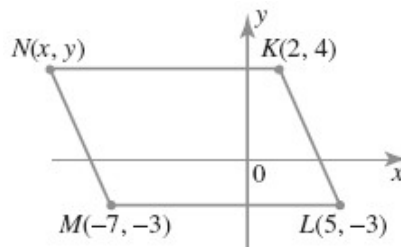
3. Find the area of  $ABCD$ .

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**Exercise 7.1.4** For the figure given below:



1. Find the co-ordinate of  $N$  in the second quadrant such that  $KLMN$  is a parallelogram.

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2. Find the perimeter of  $KLMN$ .

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3. Find the area of  $KLMN$ .

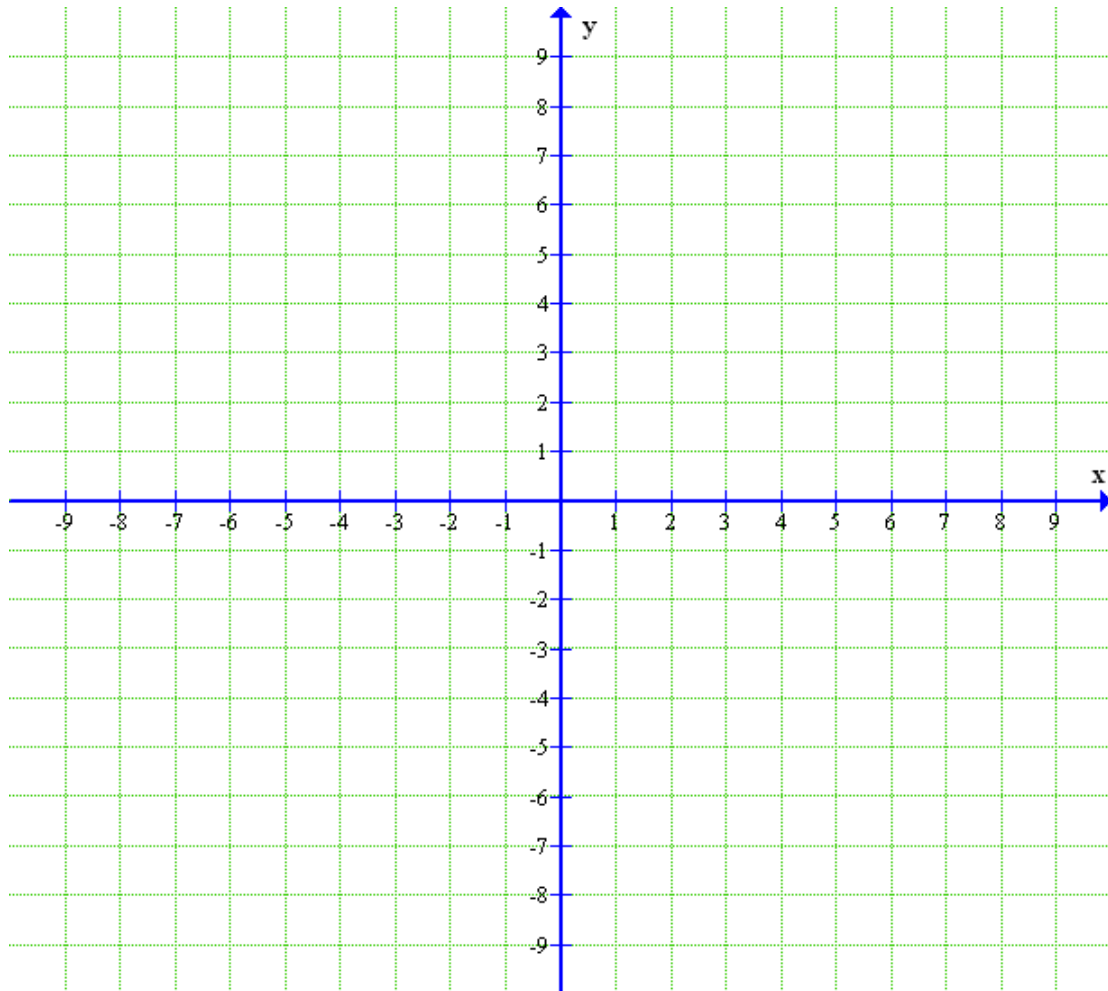
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**Exercise 7.1.5** The vertices of  $\triangle ABC$  are  $A(1, 2)$ ,  $B(5, 4)$  and  $C(9,2)$ . The perpendicular from  $B$  meets  $AC$  at  $D$ .

1. Mark this information on a diagram.



2. By inspection, what kind of triangle is  $ABC$ ?

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3. Find the area of  $\triangle ABC$

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**7.1.2 Graphing straight lines**

To graph a linear relationship using a table of value:

- substitute each x-value into the equation to find the corresponding y-value
- plot the points on a number plane
- draw a straight line through the points if appropriate.

To graph a linear relationship by it intercepts:

- substitute  $x = 0$  into the equation to find the **y-intercept**
- substitute  $y = 0$  into the equation to find the **x-intercept**
- draw a straight line through the intercepts.

**Exercise 7.1.6**

1. Draw the graph of the line  $y = 2x + 1$  using a table of values.

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2. Find the x and y intercepts and hence sketch the line  $2x + 2y = 12$ .

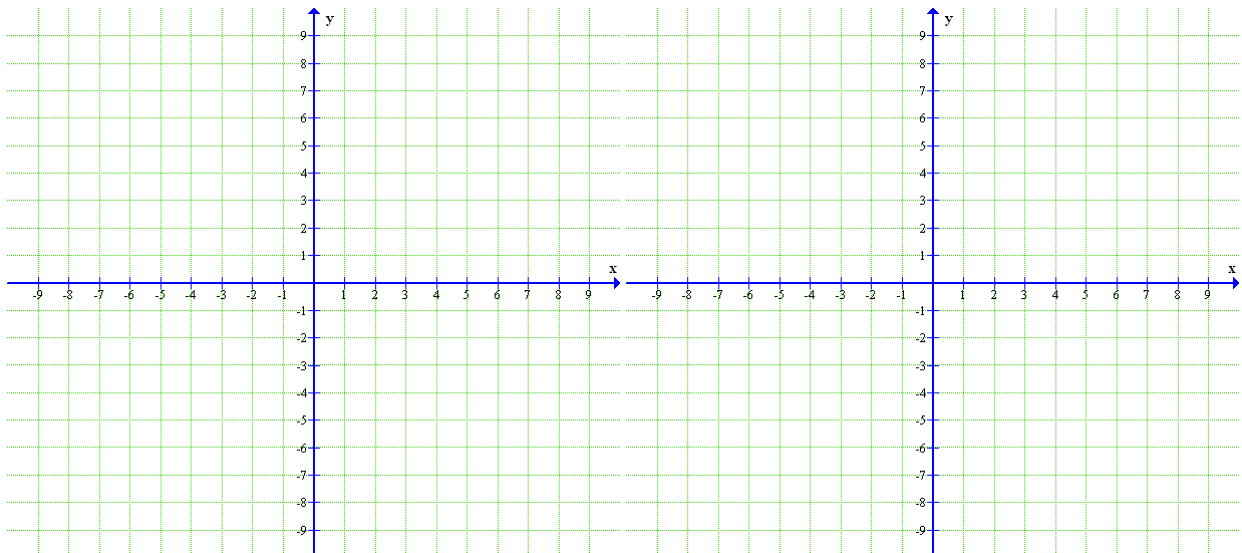
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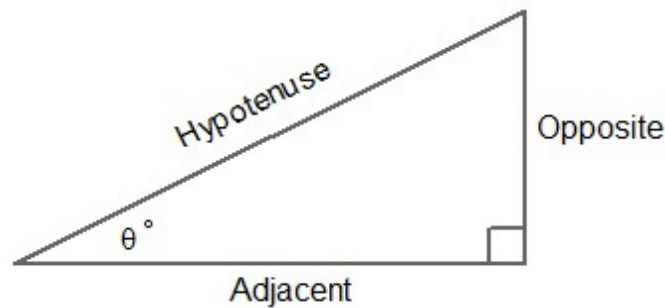


## 7.2 Trigonometry

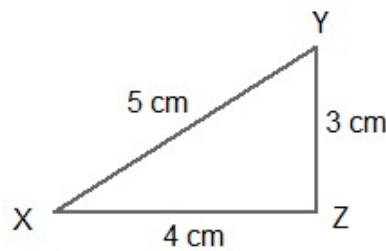
### 7.2.1 Side ratios in right-angled triangles

The sides of a right-angled triangle are named as follows:

- The side opposite the angle  $\theta$  is called the opposite.
- The side adjacent to the angle  $\theta$  is called adjacent.
- The side opposite the right angle is called the hypotenuse.



**Example 7.2.1** Find the value of each ratio on  $\triangle XYZ$ .



1.  $\frac{\text{side opposite } \angle X}{\text{hypotenuse}}$

**Solution:**  $\frac{\text{side opposite } \angle X}{\text{hypotenuse}} = \frac{3}{5}$

2.  $\frac{\text{side adjacent to } \angle X}{\text{hypotenuse}}$

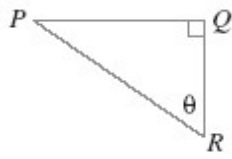
**Solution:**  $\frac{\text{side adjacent to } \angle X}{\text{hypotenuse}} = \frac{4}{5}$

3.  $\frac{\text{side opposite } \angle Z}{\text{side adjacent to } \angle X}$

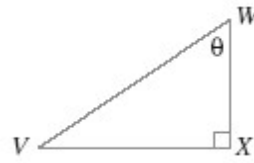
**Solution:**  $\frac{\text{side opposite } \angle Z}{\text{side adjacent to } \angle X} = \frac{5}{4}$

**Exercise 7.2.1** For each triangle below name:

1. the hypotenuse of the following figures:

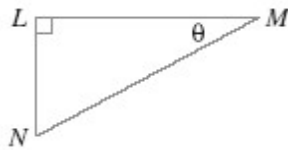


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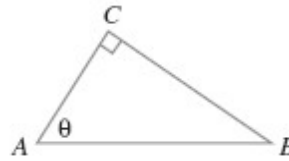


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2. the opposite side

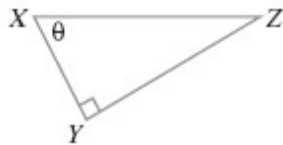


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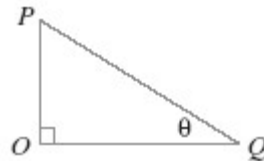


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3. the adjacent side



\_\_\_\_\_

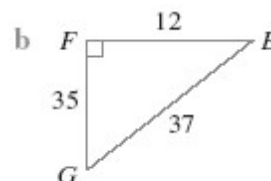
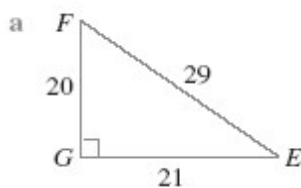


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**Exercise 7.2.2** Find the value of each ratio for the triangles below:

a.  $\frac{\text{side opposite } \angle E}{\text{side adjacent to } \angle E} = \underline{\hspace{2cm}}$  ,  $\frac{\text{side opposite } \angle E}{\text{hypotenuse}} = \underline{\hspace{2cm}}$

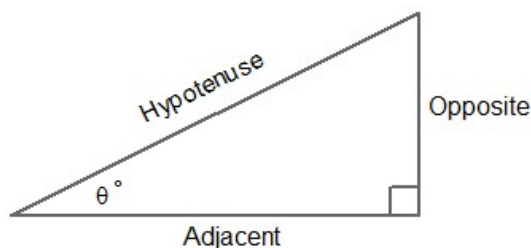
b.  $\frac{\text{side opposite } \angle E}{\text{side adjacent to } \angle E} = \underline{\hspace{2cm}}$  ,  $\frac{\text{side opposite } \angle E}{\text{hypotenuse}} = \underline{\hspace{2cm}}$





**7.2.2 The trigonometry ratios**

The definitions of the trigonometric ratio are:

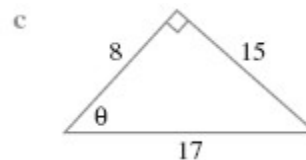
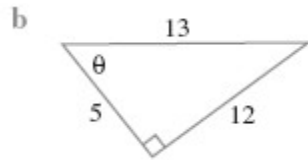
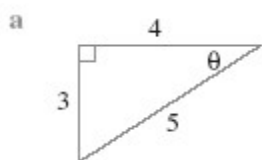


- $\sin\theta = \frac{\textit{opposite}}{\textit{hypotenuse}} = \frac{O}{H}$
- $\cos\theta = \frac{\textit{adjacent}}{\textit{hypotenuse}} = \frac{A}{H}$
- $\tan\theta = \frac{\textit{opposite}}{\textit{adjacent}} = \frac{O}{A}$

An easy way of remembering these important formulae is:

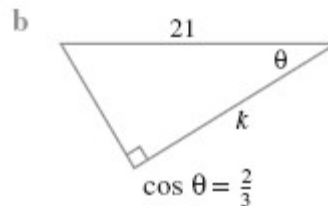
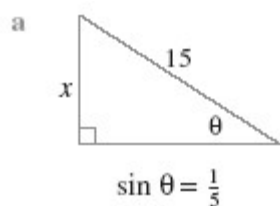
S O H      C A H      T O A  
 Some old houses can always hide their old age

**Exercise 7.2.3** For each of the following triangles, state as a fraction the value of:



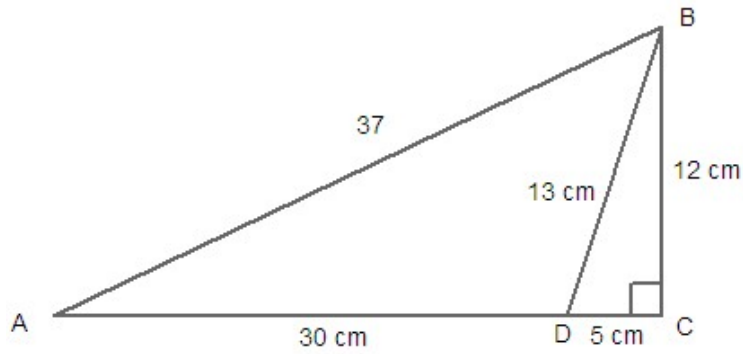
- a  $\sin\theta =$  \_\_\_\_\_  $\cos\theta =$  \_\_\_\_\_  $\tan\theta =$  \_\_\_\_\_
- b  $\sin\theta =$  \_\_\_\_\_  $\cos\theta =$  \_\_\_\_\_  $\tan\theta =$  \_\_\_\_\_
- c  $\sin\theta =$  \_\_\_\_\_  $\cos\theta =$  \_\_\_\_\_  $\tan\theta =$  \_\_\_\_\_

**Exercise 7.2.4** Find the value of the pronumeral in each of these:



- a  $x =$  \_\_\_\_\_
- b  $k =$  \_\_\_\_\_

**Exercise 7.2.5 Find the value of:**



1.  $\sin \angle ABC =$  \_\_\_\_\_

2.  $\cos \angle ABC =$  \_\_\_\_\_

3.  $\tan \angle ABC =$  \_\_\_\_\_

4.  $\sin \angle BDC =$  \_\_\_\_\_

5.  $\cos \angle BDC =$  \_\_\_\_\_

6.  $\tan \angle BDC =$  \_\_\_\_\_

7.  $\sin \angle BAC =$  \_\_\_\_\_

8.  $\cos \angle BAC =$  \_\_\_\_\_

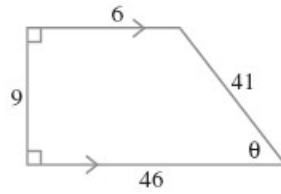
9.  $\tan \angle BAC =$  \_\_\_\_\_

10.  $\sin \angle DBC =$  \_\_\_\_\_

11.  $\cos \angle DBC =$  \_\_\_\_\_

12.  $\tan \angle DBC =$  \_\_\_\_\_

**Exercise 7.2.6** Find the values for  $\sin\theta$ ,  $\cos\theta$  and  $\tan\theta$  in this trapezium.



$\sin\theta =$  \_\_\_\_\_,  $\cos\theta =$  \_\_\_\_\_,  $\tan\theta =$  \_\_\_\_\_

**Exercise 7.2.7**

1. In  $\triangle ABC$ ,  $AB$  is perpendicular to  $BC$  and  $AB = BC$ . Find value of  $\tan A$ .

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\_\_\_\_\_

2. In  $\triangle PQR$ ,  $\angle Q = 90^\circ$ ,  $PQ = 14$  cm and  $QR = 48$  cm. Find the value of  $\tan\angle QPR$  and  $\tan\angle PRQ$ .

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3. For each of the following, draw a right-angled triangle and label one of the acute angles as  $\theta$ . Use the given ratio and Pythagoras's theorem to find values of the other ratios.

(a) If  $\sin\theta = \frac{7}{25}$ , find the values of  $\cos\theta$  and  $\tan\theta$ .

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(b) If  $\cos\theta = \frac{24}{30}$ , find the values of  $\sin\theta$  and  $\tan\theta$ .

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\_\_\_\_\_

### 7.3 Maths Challenge

#### Exercise 7.3.1

1. Let  $x$  and  $y$  be positive integers such that  $x^2 + 3x + y^2 = 404$ . What is the value of  $x + y^3$ ? Find all possible solutions.

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2. Find the number of solutions to the equation  $2x + 5y = 2005$ , where  $x$  and  $y$  are positive integers.

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3. A rectangle has area  $6 \text{ cm}^2$  and diagonal of length  $2\sqrt{5} \text{ cm}$ . What is its perimeter?

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4. All positive integers, one after another are written in a spiral way as shown below. Where does the number 2009 appear with respect to 1? (For example, 12 appears one unit down and two units to the right of 1.)

7	8	9	10
6	1	2	11
5	4	3	12
..	15	14	13

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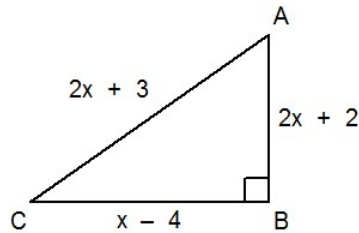
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## 7.4 Miscellaneous Exercise

### Exercise 7.4.1

1. The figure shown below is right-angled triangle  $ABC$  where  $AB = (2x + 2)$  cm,  $BC = (x - 4)$  cm and  $AC = (2x + 3)$  cm.



- (a) Using Pythagoras' Theorem, form an equation in terms of  $x$ .

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- (b) Solve this equation and hence find the perimeter of  $\triangle ABC$ .

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- (c) Find the size of  $\angle BAC$ , correct the answer to the nearest minutes.

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2. In parallelogram  $ABCD$ , the diagonal  $AC$  is at the right angles to  $AB$ . If  $AB = 12$  cm and  $BC = 13$  cm. Find the area of the parallelogram.

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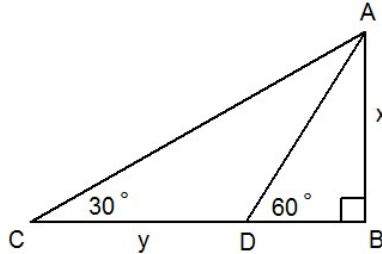
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**Exercise 7.4.2**

1. In the diagram shown below,  $AB = x$ ,  $CD = y$  and  $BC = 12$  cm. Given that  $\tan 30^\circ = \frac{\sqrt{3}}{3}$  and  $\tan 60^\circ = \sqrt{3}$ , find the value of  $x$  and  $y$ , leaving your answers in surd form.




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2. Two parallel chords in a circle of radius 7.5 cm measure 12 cm and 9 cm. They are on the same side of the circle.

(a) Calculate the distance between them.

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(b) Find also the angle subtended at the centre by the chord of length 9 cm.

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3. One diagonal of a rhombus is 24 cm. Find the length of the other diagonal if each side of the rhombus measures 13 cm.

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