# Year 9 Term 2 Homework

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

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# 2 Year 9 Term 2 Week 2 Homework

## 2.1 Equations, inequations and formulae

### 2.1.1 Changing the Subject of a Formula

**Exercise 2.1.1 Make x the subject of each formula.**

1. $z = 5y(4 - 2x)$

2. $z = \frac{x+y}{3} + \frac{z+y}{4}$

3. $\frac{a}{4x} = \frac{4x}{b}$

4. $y = \frac{x}{x+3}$

5. $y = \frac{x+2}{x-2}$

6. $c = \frac{a-bx}{x-b}$

### 2.1.2 Inequations

**Exercise 2.1.2 Solve the following inequations**

1. $2x + 15 < x + 40$

2. $2 - 4y \leq 23 - y$

3. $2(5a - 3) \geq 2(3a + 7)$

4. $3(b - 6) \geq 5(b - 8)$

**Exercise 2.1.3 Further applications**

1. $4 \leq x - 3 \leq 12$

2. $8 \leq 3x - 1 \leq 20$

3. $10 < \frac{3x}{4} - 2 < 16$

4. $20 \leq \frac{x}{3} + \frac{x}{2} \leq 25$

### 2.1.3 Problem Solving

**Exercise 2.1.4 Solve each of these equations**

1. $\frac{12-4x}{2} - \frac{8-3x}{3} = 2$

2. $\frac{1}{3}(x-2) + \frac{1}{4}(x+2) = \frac{1}{2}$

3. $\frac{1}{3}x - \frac{3}{4}(x-2) = \frac{5}{6}x$

4. $\frac{5(3+x)}{6} - \frac{5(2x+1)}{8} = 2\frac{2}{3}$

5. $\frac{3}{x-2} - \frac{2}{x+2} = \frac{5}{x^2-4}$

6. $\frac{x+4}{x-2} = \frac{x+8}{x-6}$

## 2.2 Measurement

### 2.2.1 Common Conversions

The common conversions for length are:

- 1 km = 1000 m
- 1 m = 100 cm
- 1 cm = 10 mm

The common conversions for mass are:

- 1 t = 1000 kg
- 1 kg = 1000 g
- 1 g = 1000 mg

The common conversions for capacity are:

- 1 Ml = 1000 kL
- 1 kL = 1000 L
- 1 L = 1000 mL

The common conversions for time are:

- 1 day = 24 hours
- 1 hour = 60 min
- 1 min = 60 s

The common conversions for area are:

- $1\,ha = 10,000\,m^2$
- $1\,m^2 = 10,000\,cm^2$
- $1\,cm^2 = 100\,mm^2$

The common conversions for volume are:

- $1\,m^3 = 1,000,000\,cm^3 = 1000L$
- $1\,cm^3 = 1000\,mm^3$
- $1\,cm^3 = 1\,mL$

### 2.2.2 Accuracy and Precision

- The accuracy of a measurement or device refers to how close the reading to the exact value of the quantity.
- The precision of a measuring instrument refers to smallest unit that is marked on it. For example, a metre ruler that is marked in cm intervals has a precision f 1 cm.
- All measurements are accurate to within $\pm\frac{1}{2}$ of the smallest unit marked on the measuring instrument.
- The smaller limit of accuracy is called the lower bound.
- The greater limit of accuracy is called the upper bound.
- The exact value is greater than or equal to lower bound but less than the upper bound.

**Example 2.2.1 State the limits of accuracy of the following measurements.**

1. *The temperature of a sick child is* $39^oC$*, correct to the nearest* $1^oC$*.*
   *Solution: the temperature is given correct to nearest* $1^oC$*, so the possible error is* $\pm(\frac{1}{2} \times 1^oC)$*, i.e.* $\pm 0.5^oC$*. Therefore, the limits of accuracy are* $39 \pm 0.5^oC$*. The actual temperature of the child must lie between* $38.5^C to 39.5^C$*.*
2. *The height of a man is 180 cm, correct to the nearest 10 cm.*
   *The height is given correct to the nearest 10 cm, so the possible error is* $\pm(\frac{1}{2} \times 10cm)$*. Therefore, the limits of accuracy are* $180 \pm 5cm$*. The actual height of the man must lie between 175 and 185 cm.*

**Exercise 2.2.1 Within what limits are the following instruments accurate?**

1. *A dressmaker's tape marked in millimeters.* _____
2. *A speedometer with 10km/h markings.* _____
3. *A metre ruler marked in centimeters.* _____
4. *A trundle wheel with a circumference of 1 m and no other markings.* _____
5. *A thermometer marked in intervals of* $2^oC$*.* _____
6. *A measuring tape with 1 cm markings.* _____
7. *A set of balance scales marked in intervals 100 g.* _____

**Example 2.2.2 State the upper and lower bounds of each measurement.**

1. *A mass of 6.2 kg.*
   ***Solution:*** *The mass is given correct to the nearest tenth of a kilogram, so the possible error is* $\pm(\frac{1}{2} \times 0.1kg)$*, i.e.* $\pm 0.05$ *kg.*
   *Therefore, the limits of accuracy are* $6.2 \pm 0.05$ *kg.*
   *Lower bound = 6.2 kg - 0.05 kg = 6.15 kg.*
   *Upper bound = 6.2 kg + 0.05 kg = 6.25 kg*

2. *A string of 5.18 m.*
   ***Solution:*** *The length is given to the nearest hundredth of a metre, so the possible error is* $\pm(\frac{1}{2} \times 0.01m)$ *i.e.*$\pm 0.005$ *m. Therefore, the limits of accuracy are* $5.18 \pm 0.005m$*.*
   *Lower bound* $= 5.18m - 0.005m = 5.175m$
   *Upper bound* $= 5.18m + 0.005m = 5.185m$

**Exercise 2.2.2 State the lower and upper bounds of each of the following.**

1. *The height of a girl is 145 cm.*

2. *The time required to fly from Sydney to Perth is 3 h 40 min, correct to nearest 20 min.*

3. *The capacity of a swimming pool is 2500 kL, correct to the nearest 100 kL.*

4. *The mass of a man is 86 kg, correct to the nearest kg.*

5. *The length of an envelop is 18 cm, correct to the nearest cm.*

6. *The height of a building is 128 m, correct to nearest metre.*

**Exercise 2.2.3 A rectangle piece of glass is to be cut with dimension $125cm \times 85cm$.**

1. *Find the greatest possible length and width.*

2. *Find the least possible length and width.*

3. *Within what limits should the area of the glass lie?*

**Exercise 2.2.4 Consolidation**

1. *Express each time in minutes and seconds:*

   *(a) 0.35 h*

   *(b) 3.45 h*

   *(c) 4.75 min*

   *(d) 2.4 min*

2. *From a 3.6 m piece of timber, 5 pieces of equal length are cut, leaving 28 cm. What lengths of timber were cut?*

3. *How many 225 g bags of lollies can be filled completely from a container that holds 12 kg of lollies?*

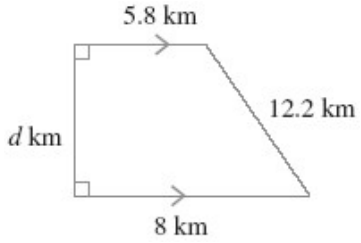
4. *A builder wants to construct a brick wall consisting of 18 layers, with 15 bricks in each layer. Calculate in kilograms the total mass of bricks needed for the job if each brick weights 2150 g.*

### 2.2.3 Pythagoras' Theorem

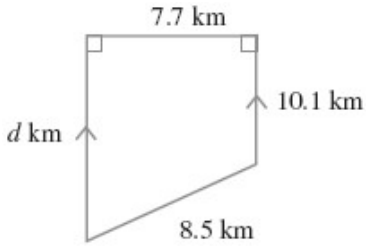
- In any right-angled triangle, the square of the hypotenuse is equal to the sum of the squares on the other two sides i.e. ($c^2 = a^2 + b^2$).
- If the square on one side of a triangle is equal to the sum of the squares the other two sides, then the angle between the two shorter sides is a right angle.

**Exercise 2.2.5 Find the value of pronumeral in each figure.**

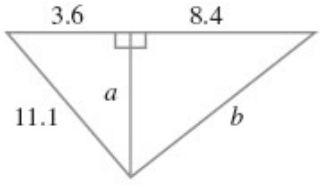
1. $d$ = _____




2. $d$ = _____




3. $a$ = _____ , $b$ = _____



## 2.3 Miscellaneous Exercises

**Exercise 2.3.1 Problem solving**

1. *If a car travels at 15 m/s, what is the speed in km/h?*

2. *Solve for x :* $px - q = qx - p$.

3. *Solve:* $12 \leq \frac{-2(4-3x)}{3}$

4. *The sum of four consecutive odd numbers is 112. Find the average of the first number and the second number.*

5. *The cost of 1 kg of pork is 70% the cost of 1 kg of chicken. Each kg of pork costs $1.80 less than a kg of chicken. Find the total cost of 5 kg of chicken and 6 kg of pork.*

6. *A rectangular tank 90 cm long and 70 cm wide contains some water and 5 bricks each with a volume of 720* $cm^3$*. The height of the water level is 30 cm. If water is drained out at the rate of 6 litres per minute, how long would it take to empty the water in the tank in minutes?*
*(Note: 1 L = 1000 mL = 1000* $cm^3$*)*