Year 9 Term 2 Homework

Student Name: _____ **Grade**: _____

Date: _____ **Score**: _____

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1   Year 9 Term 2 Week 1 Homework

1.1   Equations, inequations and formulae

1.1.1   Evaluate the Subject of a Formula

Exercise 1.1.1 Substitution into a formula

1. If $A = P(1 + \frac{r}{100})^n$, *find the A when P = 10000, r = 20 and n = 2.*

2. If $T = \frac{n}{2}[2a + (n-1)d]$, *find T if a = 6, d = 3 and n = 8.*

3. If $M = \frac{1}{M_1} - \frac{1}{M_2}$, *find M when $M_1 = 1.2$ and $M_2 = 0.6$*

4. If $V = \frac{4}{3}\pi r^3$, *find the value of:*

    (a) *r correct to 1 decimal place when $V = 288\pi\, cm^3$.*

    (b) *r correct to 1 decimal place when $V = 200\, cm^3$.*

1.1.2   Changing the Subject of a Formula

Exercise 1.1.2 Make y the subject:

1. $6x - 12 = 3y - 2x$

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2. $xy - 7 = ax + by$

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3. $3(4x - 2y) = 15x - 3$

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4. $2y = \frac{3xy}{5} - 4$

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

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6. $\frac{y}{y-6} = \frac{2x}{3}$

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1.1.3   Inequations

An **inequation** is a number sentence in which two quantities are not equal.

Graphing solutions on the number line:

- place the number that occurs in the solution at the centre of the number line segment.

- draw a closed dot • on this number f the inequality sign is $\geq$ or $\leq$.

- draw an open dot ○ on this number if the inequality sign is > or <.

- from the dot, draw an arrow along the number line in the direction indicated by the inequality sign.

When multiplying or dividing both sides of an inequation by a negative number, reverse the inequality sign.
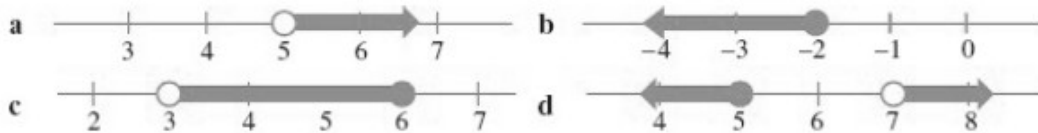
Example 1.1.1 Graph each of these inequation on a number line:

a. $x > 5$ b. $x \leq -2$ c. $3 < x \leq 6$ d. $x \leq 5 \text{ or } x > 7$

Example 1.1.2

1. $4x + 2 \leq 26$

   > **Solution:**
   > $$4x + 2 \leq 26 \;\Rightarrow\; 4x \leq 24$$
   > $$\therefore\; x \leq 6.$$

2. $5x + 3 \geq 2x + 12$

   > **Solution:**
   > $$5x + 3 \geq 2x + 12 \;\Rightarrow\; 5x - 2x \geq 12 - 3$$
   > $$3x \geq 9$$
   > $$\therefore\; x \geq 3$$

3. $9 \leq \frac{x}{4} + 3$

   > **Solution:**
   > $$9 \leq \frac{x}{4} + 3 \;\Rightarrow\; 6 \leq \frac{x}{4}$$
   > $$24 \leq x$$
   > $$\therefore x \geq 24$$

Exercise 1.1.3 Solve the following inequations and graph the solution on a number line.

1. $3x - 1 \geq 14$

2. $19 < 2x + 7$

3. $6 \leq 8(3x - 2)$

4. $2 - 4x \leq 14 - x$

5. $\frac{x-2}{4} \leq 3$

6. $15 + \frac{x}{2} \geq 8$

7. $2 - \frac{x-2}{4} \geq 5$

8. $\frac{2x}{3} - \frac{x}{5} \geq 21$

1.1.4 Problem Solving

Exercise 1.1.4 Solve the following inequation problems:

1. *If a certain integer is increased by 3 and the result is greater than 7 but less than 13. Find all possible values for the integer.*

2. *Two sides of a given triangle are 10 cm and 26 cm. What is the range of the possible lengths for the third side of the triangle?*

3. *A rectangle is to be constructed with length x cm and width (x-7) cm. The perimeter of the rectangle is to be less than 36 cm. What are the possible values for x?*

4. *The sum of 3 consecutive integers is greater than 9 but no more than 20. What could the integers be?*

Exercise 1.1.5 Solve the following problems:

1. *Find two numbers such that their sum is 20, while half their difference is 1.*

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   _____

2. *A 2.8 m length of timber is cut into 4 pieces. One piece is twice the length of the shortest piece and the others are 30 cm longer than the shortest piece. Find the length of each piece of timber.*

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3. *Consider a square garden with sides x metres long. A path p metres wide surrounds a square area of lawn with side y metres, as shown in the figure below:*
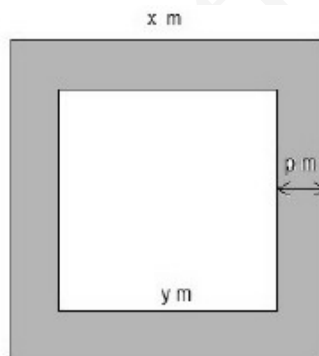
   (a) Write down a formula for y in terms of x and p.

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   _____

   (b) If x = 16 m and p = 2 m, find the area of the path.

   _____

   _____

   _____

1.2   Maths Challenge

Exercise 1.2.1

1. *If $a\#b = ab - 1$, find the value of $\frac{(2\#3)\#5}{2\#(3\#5)}$.*

2. *If "&" represents an operation defined as $x\&y = x^y + y^x$, find the value of $(2\&3)\&2$.*

3. *If $\frac{x+y}{x-y} = 1\frac{3}{4}$, find the value of $\frac{x^2}{y^2}$.*

4. *Let $x = \frac{1}{2}(\sqrt[3]{7} - \frac{1}{\sqrt[3]{7}})$, find the value of $(x + \sqrt{1 + x^2})^3$.*