Important Concepts

Preview Review

Mathematics Grade 8 TEACHER KEY
W2 - Lesson 1: Modelling and Solving Linear Equations Using Algebra Tiles
## Important Concepts of Grade 8 Mathematics

| W1 - Lesson 1 | Perfect Squares and Square Roots |
| W1 - Lesson 2 | Working with Ratios and Rates |
| W1 - Lesson 3 | Multiplying and Dividing Fractions |
| W1 - Lesson 4 | Multiplying and Dividing Integers |
| W1 - Lesson 5 | Working with Percents |
| W1 - Review | |
| W1 - Quiz | |

| W2 - Lesson 1 | Modelling and Solving Linear Equations Using Algebra Tiles |
| W2 - Lesson 2 | Solving Linear Equations |
| W2 - Lesson 3 | Graphing and Analyzing Linear Relations |
| W2 - Lesson 4 | Critiquing the Representation of Data |
| W2 - Lesson 5 | Probability of Independent Events |
| W2 - Review | |
| W2 - Quiz | |

| W3 - Lesson 1 | Pythagorean Theorem |
| W3 - Lesson 2 | Calculating Surface Area |
| W3 - Lesson 3 | Calculating Volume |
| W3 - Lesson 4 | Drawing 3-D Objects |
| W3 - Lesson 5 | Congruence of Polygons |
| W3 - Review | |
| W3 - Quiz | |

### Materials Required
- Protractor
- Ruler
- Calculator

### No Textbook Required
This is a stand-alone course.

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Preview/Review Concepts for Grade Eight Mathematics

Teacher Key

W1 – Lesson 1:
Modelling and Solving Linear Equations Using Algebra Tiles
OBJECTIVES

By the end of this lesson, you will be able to:

• Model a linear equation using algebra tiles
• Solve a linear equation using algebra tiles

GLOSSARY

Linear equation – equations that form a straight non-vertical and non-horizontal line when graphed

Variable – a symbol (usually a letter) that represents an unknown value or values

Zero pairs – tiles that represent opposite values that have a sum of zero
W2 – Lesson 1: Modelling and Solving Linear Equations using Algebra Tiles

Materials required:

- Paper, Pencil, and Algebra Tiles

Part 1: Modelling Linear Equations using Algebra Tiles

A linear equation can be modelled using algebra tiles.

To represent a linear equation, first determine how many x-tiles you will need and whether they are positive or negative.

Then determine how many unit tiles you will need and whether they will be positive or negative.

Example 1

Model the linear equation \(-3x = 9\) using algebra tiles.
To represent \(-3x\), you will need three unshaded x-tiles.
To represent 9, you will need nine shaded unit tiles.

\[
\begin{align*}
\text{+X} & \quad \text{-X} & \quad \text{+1} & \quad \text{-1} \\
\text{[x-tiles]} & \quad \text{[unit tiles]} & \quad \text{[unit tiles]} & \quad \text{[unit tiles]}
\end{align*}
\]
Example 2

Model the linear equation $5x + 2 = -8$ using algebra tiles.
To represent $5x$, you will need five shaded $x$-tiles.
To represent 2, you will need two shaded unit tiles.
To represent -8, you will need eight unshaded unit tiles.

Example 3

Model the linear equation $3(x + 2) = -12$ using algebra tiles.
To represent $x + 2$, you will need a set that includes one shaded $x$-tile and two shaded unit tiles.
To represent $3(x + 2)$, you will need three sets of the $x + 2$ tiles.
To represent -12, you will need twelve unshaded unit tiles.
Practice Questions

Model the following linear equations using algebra tiles.

1. \(2x - 8 = 6\)

   *To represent \(2x\), you will need two shaded \(x\)-tiles.*
   *To represent -8, you will need eight unshaded unit tiles.*
   *To represent 6, you will need six shaded unit tiles.*

\[
\begin{array}{c}
\text{\includegraphics{algebra-tiles-2x-8-6.png}} \\
\end{array}
\]

2. \(-7x = -21\)

   *To represent \(-7x\), you will need seven unshaded \(x\)-tiles.*
   *To represent -21, you will need twenty unshaded unit tiles.*

\[
\begin{array}{c}
\text{\includegraphics{algebra-tiles-7x-21.png}} \\
\end{array}
\]

3. \(2(x + 4) = -9\)

   *To represent \(x + 4\), you will need a set that includes one shaded \(x\)-tile and four shaded unit tiles.*
   *To represent \(2(x + 4)\), you will need two sets of the \(x+4\) tiles.*
   *To represent -9, you will need nine unshaded unit tiles.*

\[
\begin{array}{c}
\text{\includegraphics{algebra-tiles-2x4.png}} \\
\end{array}
\]
Part 2: Solving Linear Equations Using Algebra Tiles

When solving linear equations using algebra tiles you must apply the concept of zero pairs. A zero pair is a pair of opposite coloured tiles that have a sum of zero. In other words they cancel each other out.

\[ (+2) + (+2) = 0 \]

When solving linear equations, the goal is to get all the x-tiles on one side of the equal sign and all the unit tiles to the other side of the equal sign. Use the concept of zero pairs to do this.

When all the x-tiles are on one side of the equal sign and the units tiles are on the other side, distribute the unit tiles evenly among the x–tiles.

If you end up with negative x-tiles, change them to positive x-tiles and change the unit tiles to their opposite colours (hence value) as well.
**Practice Questions**

Solve the following linear equations using algebra tiles.

1. \( 4x = -12 \)

\[
\begin{align*}
\begin{array}{c}
\text{4 large units} \\
\text{equals} \\
\text{12 small units}
\end{array}
\end{align*}
\]

2. \( -3x - 6 = 18 \)

\[
\begin{align*}
\begin{array}{c}
\text{3 large units} \\
\text{equals} \\
\text{6 small units}
\end{array}
\end{align*}
\]
3. \(2(x+7) = -6\)

\[
\begin{array}{c}
\hline
\text{[Diagram]} \\
\hline
\end{array}
\]

\[
\begin{array}{c}
\hline
\text{[Diagram]} \\
\hline
\end{array}
\]

\[
\begin{array}{c}
\hline
\text{[Diagram]} \\
\hline
\end{array}
\]

\[
\begin{array}{c}
\hline
\text{[Diagram]} \\
\hline
\end{array}
\]

\[
\begin{array}{c}
\hline
\text{[Diagram]} \\
\hline
\end{array}
\]

\[
\begin{array}{c}
\hline
\text{[Diagram]} \\
\hline
\end{array}
\]

\[
\begin{array}{c}
\hline
\text{[Diagram]} \\
\hline
\end{array}
\]

\[
\begin{array}{c}
\hline
\text{[Diagram]} \\
\hline
\end{array}
\]
Lesson 6: Assignment

Solve the following linear equations using algebra tiles.

1. \( 2x = -8 \)

\[
\begin{align*}
\text{\[\text{\_\_}\]} & = \begin{array}{c}
\text{\_
}\end{array} \\
\downarrow & \\
\text{\[\text{\_\_}\]} & = \begin{array}{c}
\text{\_
}\end{array} \\
\downarrow & \\
\text{\[\text{\_\_}\]} & = \begin{array}{c}
\text{\_
}\end{array}
\end{align*}
\]

2. \( -5x = 10 \)

\[
\begin{align*}
\text{\[\text{\_\_}\]} & = \begin{array}{c}
\text{\_
}\end{array} \\
\downarrow & \\
\text{\[\text{\_\_}\]} & = \begin{array}{c}
\text{\_
}\end{array} \\
\downarrow & \\
\text{\[\text{\_\_}\]} & = \begin{array}{c}
\text{\_
}\end{array} \\
\downarrow & \\
\text{\[\text{\_\_}\]} & = \begin{array}{c}
\text{\_
}\end{array}
\end{align*}
\]
3. \[ 2x + 5 = 17 \]

\[
\begin{align*}
\text{\[ \begin{array}{c}
\hline
2x
\hline
\end{array} \right] + \begin{array}{c}
\hline
5
\hline
\end{array} &= \begin{array}{c}
\hline
17
\hline
\end{array}
\end{align*}
\]

\[
\begin{align*}
\text{\[ \begin{array}{c}
\hline
2x
\hline
\end{array} \right] &= \begin{array}{c}
\hline
12
\hline
\end{array}
\end{align*}
\]

\[
\begin{align*}
\text{\[ \begin{array}{c}
\hline
12
\hline
\end{array} \right] &= \begin{array}{c}
\hline
5
\hline
\end{array}
\end{align*}
\]

\[
\begin{align*}
\text{\[ \begin{array}{c}
\hline
12
\hline
\end{array} \right] &= \begin{array}{c}
\hline
7
\hline
\end{array}
\end{align*}
\]

\[
\begin{align*}
\text{\[ \begin{array}{c}
\hline
7
\hline
\end{array} \right] &= \begin{array}{c}
\hline
5
\hline
\end{array}
\end{align*}
\]

\[
\begin{align*}
\text{\[ \begin{array}{c}
\hline
5
\hline
\end{array} \right] &= \begin{array}{c}
\hline
5
\hline
\end{array}
\end{align*}
\]

\[
\begin{align*}
\text{\[ \begin{array}{c}
\hline
5
\hline
\end{array} \right] &= \begin{array}{c}
\hline
5
\hline
\end{array}
\end{align*}
\]
4. \[-4x - 4 = 12\]
5. \[6(x + 5) = 22\]
6. \(2(x + 4) = 14\)