

3.5 – Collect Like Terms

MPM1D

SOLUTIONS

1. Which polynomial contains no like terms?

- A) $2x + 5 - 3x + 2xy$
- B) $3x^2 + 3xy + 3$
- C) $4 - 9x + 9y + 3$
- D) $-4a^3 + 5b - 2a^2 + 7b$

2. Classify each pair of terms as either like or unlike.

a) $2x$ and $-5x$

like

b) $3y$ and $3z$

unlike

c) $-x^2$ and $\frac{1}{2}x^2$

like

d) $4a^2$ and $3a^3$

unlike

e) $2ab$ and $3a^2$

unlike

f) $5x^2y$ and $-2xy^2$

unlike

g) $3uv$ and $2vu$

like

h) $9p^2q^3$ and $-4q^3p^2$

like

3. Simplify where possible

a) $3x + 6x$

$= 9x$

b) $2m + 5n$

can't simplify

c) $5h + 8h + 2h$

$= 15h$

d) $7u + 4u + u$

$= 12u$

4. Simplify if possible

a) $4k - 2k$

$= 2k$

b) $8n - n$

$= 7n$

c) $3z - 7z$

$= -4z$

d) $p - 6$

can't simplify

5. Simplify by collecting like terms.

a) $3x + 5 + 2x + 1$

$$= 3x + 2x + 5 + 1$$
$$= 5x + 6$$

b) $2k + 3m + 4m + 6k$

$$= 2k + 6k + 3m + 4m$$
$$= 8k + 7m$$

c) $8n + 5 - 3n - 2$

$$= 8n - 3n + 5 - 2$$
$$= 5n + 3$$

6. Simplify

a) $3x - 8 - 4 + 3$

$$= 3x - 9$$

b) $2x^2 + 7x + 4x^2 + x$

$$= 2x^2 + 4x^2 + 7x + x$$
$$= 6x^2 + 8x$$

c) $7m + 6m^2 - 2m + m^2$

$$= 6m^2 + m^2 + 7m - 2m$$
$$= 7m^2 + 5m$$

d) $3k - 5 + 8 - k + 1 - 4k$

$$= 3k - k - 4k - 5 + 8 + 1$$
$$= -2k + 4$$

e) $-3u + 2 - u^2 - 5 + 3u + 2u^2 - 3$

$$= -u^2 + 2u^2 - 3u + 3u + 2 - 5 - 3$$
$$= u^2 - 6$$

7. Simplify

a) $2a^2 - 3ab - 6 + 4b^2 + 7 + 5ab - 3b - 2a^2$

$$= 2a^2 - 2a^2 + 4b^2 - 3ab + 5ab - 3b - 6 + 7$$
$$= 4b^2 + 2ab - 3b + 1$$

b) $3mn + 6m^2 - n^2 + 3 - m^2 - 3mn + 2n^2 - 4$

$$= 6m^2 - m^2 - n^2 + 2n^2 + 3mn - 3mn + 3 - 4$$
$$= 5m^2 + n^2 - 1$$

8. The length of a rectangular field is three times its width.

$$l = 3w$$

a) Write an expression for the perimeter of the field.

$$\begin{aligned} P &= 2l + 2w \\ &= 2(3w) + 2w \\ &= 6w + 2w \\ &= 8w \end{aligned}$$

$$P = 8w$$

b) Find the perimeter if the field is 300 m wide.

$$\begin{aligned} P &= 8(300) \\ &= 2400 \end{aligned}$$

$$2400 \text{ m}$$

c) Find the length and width of the field if the perimeter is 1600 m.

$$1600 = 8(w)$$

$$w = \frac{1600}{8}$$

$$w = 200$$

$$\begin{aligned} l &= 3(200) \\ &= 600 \end{aligned}$$

$$\begin{aligned} l &= 600 \text{ m} \\ w &= 200 \text{ m} \end{aligned}$$

9 (extension).

a) An equilateral triangle has an unknown side length, x . Write a simplified expression for its perimeter.

$$P = 3x$$

b) A right isosceles triangle has two sides equal to x . Which triangle, the equilateral triangle in part a) or the right isosceles triangle, has the greater perimeter? Use algebraic reasoning.

$$\begin{aligned} P_{\text{isosceles}} &= 2x + x\sqrt{2} \\ &= 3.4x \end{aligned}$$

$$3.4x > 3x$$

∴ the isosceles triangle has a greater perimeter.

