

6.1.5: Practice

1. Terms that have equivalent variable parts are called _____

2. Terms with variable parts that are NOT equivalent are called _____

$2x$, $3x$ and $-5x$ are like terms.

$-6a^3$, a^3 , $5aaa$ and $32a^3$ are like terms.

8 , 1 , -63 and -4 are like terms.

$7x^3y^2$, x^3y^2 , $4xxxyy$ and $-6y^2x^3$ are like terms.

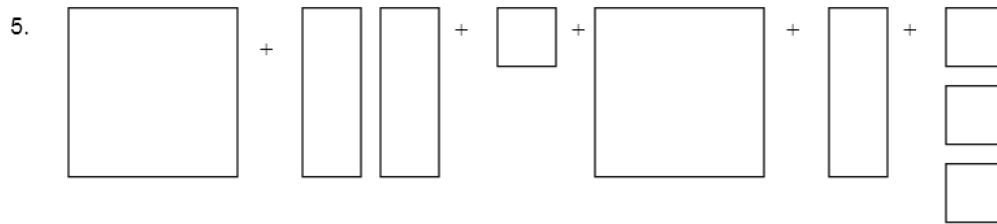
3. Look at each pair of terms and decide if they are like terms or unlike terms. Circle the correct answer.

$3x^2$ and $4xx$ LIKE UNLIKE	$2a^3$ and $5a^3$ LIKE UNLIKE	$4x$ and $7y$ LIKE UNLIKE
$6x^4$ and $2x^3$ LIKE UNLIKE	$3xy$ and $2yx$ LIKE UNLIKE	$7c$ and 7 LIKE UNLIKE
5 and -13 LIKE UNLIKE	$7x^2y$ and $3yxx$ LIKE UNLIKE	$4x$ and $-4x$ LIKE UNLIKE

4. Match the like terms.

$3x$	$6y^2$
$-4y^4$	$7xy$
$17x^4y$	$5x$
$6a^4$	13
$3xxx$	$3x^4y$
$10s$	$9a^4$
-8	$-7c$
$6yx$	s
c	$10x^3$

6.1.5: Practice (continued)



What do you have? Explain in words, and explain using algebra tiles.

6. $2x^2 + 5x - 1 + 3x + 4$. Using algebra tiles or draw pictures to represent this algebraic expression.

7. $(x^2 - 3x + 2) + (2x^2 - 3x - 4)$. Using algebra tiles or draw pictures to represent this algebraic expression.

8. $(2x^2 - 5x + 3) - (x^2 - 3x + 2)$. Using algebra tiles or draw pictures to represent this algebraic expression.

9. $(3x^2 - 3x + 2) + (2x^2 - 3x - 4)$. Using algebra tiles or draw pictures to represent this algebraic expression.

6.2.2: Adding and Subtracting Polynomials

A Coaches B	B Coaches A
1. $(x + 1) + (2x + 3)$	2. $(4x - 5) - (2x + 3)$
3. $(x^2 + 5x + 3) + (x^2 + 6x - 2)$	4. $(x^2 + x + 2) + (x^2 + x + 1)$
5. $2x^3 - 5x^2 + 6x - 8 + 3x^2 - 8x + 2$	6. $2x - 3y + 5x^2 - 6y^2 - 3y + 2x - 2x^2$
7. $12a - 15b + 22a - 16b - 2a - 6b$	8. $2a - 21a + 32b - 6b - 12b - 16a$

6.2.4: Practice

Collect like terms.

1) $4x + 8y + 3x =$

2) $5y + 8y + 4z =$

3) $3 + 9b + 10 =$

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

5) $6xy + 3xy + 3x =$

6) $-3ab - 10a - 8a =$

7) $-4x^2y - 6 - 6x^2y =$

8) $7a + 5c + 4c =$

9) $4x^2 + 9 + 4x^2 =$

10) $x + 3y + 3x =$

11) $10x^4 + 8x^4 + 6x^3 =$

12) $xy + x + xy =$

13) $a + a + 5 =$

14) $6a + 7b + 5a + 7b =$

15) $3x + 6y + 2y + 8x =$

16) $4x + x + 3x + 8y =$

17) $5a + 3b + 4c + 2a =$

18) $8a^2 + 4ab + 6a - 8a^2 =$

19) $9x^2 + 10 + 4x^2 + 7 =$

20) $7x^2y + 8 - 5x^2y + 4 =$

21) $6x^3 + 9x + 10x^3 + 4x^2 =$

22) $7a + 5b + c + 4a - 3b =$

23) $-6xy + 8xy + 5xy - 2xy =$

24) $10x^4 - 8x^3 + 4x^3 - 5x^2 + 3x =$

25) $4xy - 4xz + 7xy - 11xy =$

6.2.4: Practice (continued)

26) Use algebra tiles to show that the given three expressions are equivalent:

(a) $2 + 4n$

(b) $1 + 2n + 2n + 1$

(c) $6 + n - 4$

27) Simplify each of the following using algebra:

(a) $3x + 2x + 4x$

(b) $3x + 4 + 2x + 1$

(c) $2x + 5 - 2x - 3$

(d) $-3x + 6 - x - 8$

28) Simplify first then evaluate where $x = 2$ and $y = -1$.

(a) $9x + 2y - 4x + 3y$

(b) $8y - 4y + 3x + 2y$

6.3.1: Equivalent Algebraic Expressions

1. Express the following using algebra tiles.

a) 3 groups of 3	b) 3 groups of x
c) 3 groups of $(x+2)$	d) $3(x+2)$
e) $3(x - 1)$	f) $3x - 3$

2. a) Which expressions are equivalent?

b) Is there a pattern or rule?

6.3.2: Exploring the Distributive Property (Using CAS or Algebra Tiles)

Using Nspire CAS or Algebra Tiles, complete the table by expanding each expression:

Refer to page 6-18 of the Instruction Booklet for the TI-nspire CAS instructions

$2(3)$		$3(4)$	
$2(x + 1)$		$3(x + 1)$	
$2(2x - 1)$		$3(2x - 1)$	
$2(3x + 4)$		$3(3x + 4)$	
$2(5x - 10)$		$3(6x - 12)$	
$2(4m + 3n)$		$3(5d + 4g)$	
$2(x^2 - 2x)$		$3(x^3 - 2x)$	
$2(2m^2 - 3m + 5)$		$3(2m^2 - 3m + 6)$	
$2(4g - 5h + 3k - 2l)$		$3(4g - 5h + 3k - 2l)$	
What happens when you multiply each bracket by 2?		What happens when you multiply each bracket by 3?	

$4(3)$		$5(4)$	
$4(x + 1)$		$5(x + 1)$	
$4(2x - 1)$		$5(2x - 1)$	
$4(3x + 4)$		$5(3x + 4)$	
$4(5x - 10)$		$5(6x - 12)$	
$4(4m + 3n)$		$5(5d + 4g)$	
$4(x^2 - 2x)$		$5(x^3 - 2x)$	
$4(2m^2 - 3m + 5)$		$5(2m^2 - 3m + 6)$	
$4(4g - 5h + 3k - 2l)$		$5(4g - 5h + 3k - 2l)$	
What happens when you multiply each bracket by 4?		What happens when you multiply each bracket by 5?	

What's the pattern or rule?

6.3.3: Practice

Expand the following expressions to write an equivalent algebraic expression for each. Then verify using Nspire CAS or Algebra Tiles.

a) $2(x - 5) =$

b) $5(x + 1) =$

c) $4(3x - 1) =$

d) $-3(2x + 4) =$

e) $2(4x - 5) =$

f) $-5(x + 4) =$

g) $6(3x^2 - 2x + 4) =$

h) $2(5 - 5m + 6n) =$

i) $-3(3x - 4y + 5z) =$

6.4.2: Algebraic Expressions

Expand and simplify each algebraic expression. Create a word statement for your answer. The first question is completed as an example.

	Algebraic Expression	Word Statement
1.	$4x + 20 - 3x + 6$ $= x + 26$	twenty-six more than a number
2.	$3(2x - 4)$	
3.	$2(x + 4)$	
4.	$5x - 3 + 2(x + 1)$	
5.	$3(2x + 3) - 2(2x + 3)$	
6.	$(3x^2 + 4x - 3) + (2x^2 - 2x + 1)$	

6.4.3: Practice

1. Simplify.

(a) $4x + 8 - 2x + 3$

(b) $2(3x - 5)$

(c) $2(x - 3) + 4x$

(d) $3x - 2(x - 4)$

(e) $4(2x - 3) - 3(x + 5)$

(f) $(2x^2 - 3x + 1) + (x^2 + 5x + 3)$

(g) $(3x^2 + 5x - 6) - (x^2 + 2x - 8)$

2. Write an algebraic expression for each of the following:

(a) three more than a number

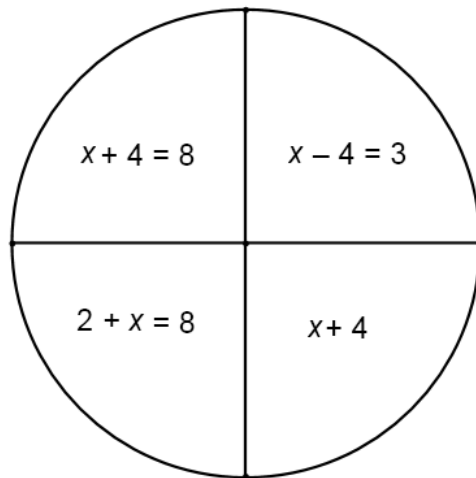
(b) eight less than twice a number

(c) a number increased by six times a different number

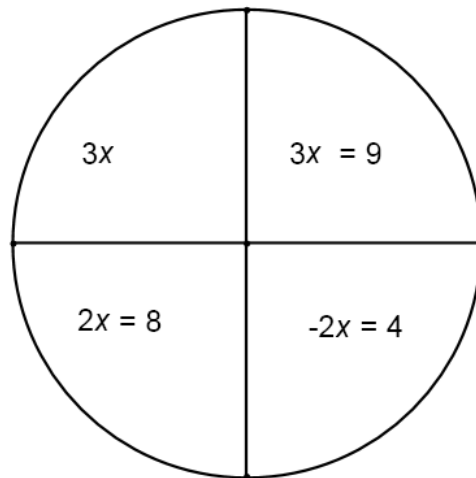
6.5.1: Concept Circles – Equations

1. Draw an "X" through the example that does not belong. Justify your answer.

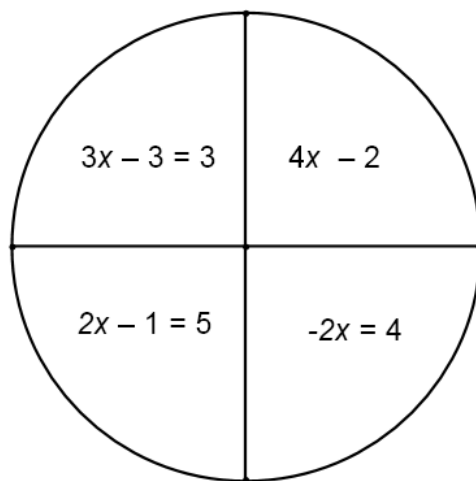
a)



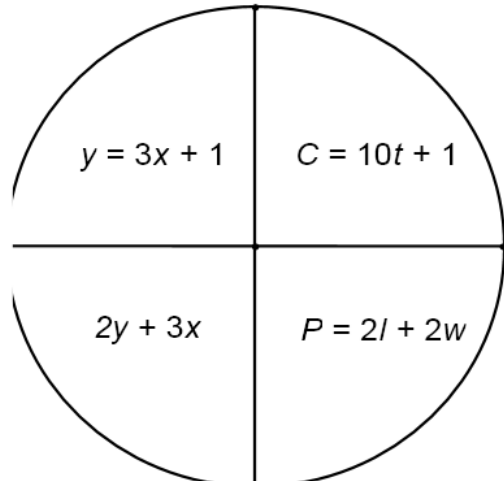
b)



c)



d)



2. Answer True (T) or False (F). Be prepared to justify your answer.

- Every equation has exactly two sides. ____
- Every equation has one equal sign. ____
- Every equation has one variable. ____

6.5.3: The Equation Game

One Step Equations

Solve each equation using **algebra tiles**. Have your partner check your answers.

$x - 2 = 4$	$g + 1 = -7$
$-4 = 2 + a$	$3 - b = -2$
$x + 1 = -3$	$t + 6 = 9$

6.5.3: The Equation Game (continued)

One Step Equations

Solve each equation using **algebra**. Have your partner check your answers.

$p - 8 = 10$	$m + 3 = 15$
$-5 = -2 + y$	$k + 6 = 9$
$4 + h = -2$	$9 - w = -2$

6.5.5 The Equation Game

Two Step Equations

Solve each equation using algebra tiles. Have your partner check your answers.

$3x - 2 = 4$	$4n + 1 = -7$
$-4 = 2 + 2a$	$3 - 5b = -2$
$-4x + 1 = -3$	$3t + 6 = 9$

6.5.5: The Equation Game (continued)

Two Step Equations

Solve each equation using **algebra**. Have your partner check your answers.

$3p - 8 = 10$	$-6m + 3 = 15$
$-5 = 2 + 14y$	$3k + 6 = -9$
$4 = -2 + 3h$	$7 - 3w = -2$

6.5.6: Equations

Complete the following Frayer model.

Definition:	Facts/Characteristics:
Examples:	Non-examples:

Equation

6.5.7: Practice

Solve the following equations using **algebra**. Check every second equation..

1) a. $s + 5 = 14$

b. $u - 5 = -14$

c. $-5 = v - 14$

d. $7x = 14$

e. $-7 = -14y$

f. $3m + 1 = 10$

g. $2h + 7 = 15$

h. $4 - 2d = -2$

i. $5y - 3 = 12$

j. $6 = 4w - 6$

k. $4 = 3t - 8$

l. $3c + 12 = 36$

6.5.7: Practice (continued)

Solve the following equations using **algebra**. Check every second equation.

2) a. $t - 2 = 7$ b. $4d = -16$ c. $2m - 4 = 10$

d. $-3 = 7 - 5p$ e. $4x + 28 = 16$ f. $5y - 12 = 13$

g. $2g - 1 = 7$ h. $-3 = 4 - 7m$ i. $-3f - 2 = 7$

j. $5k - 6 = 24$ k. $12 = 12 - 3b$ l. $-2 - 5b = -12$

6.7.2: Powers with Variable Bases

Complete the following charts using the TINspire calculator. Answer the questions below.

<u>Input</u>	<u>Answer/Output</u>
$x + x$	
$x + x + x$	
$x + x + x + x$	
$x + x + x + x + x$	
$x - x$	
$2x + x$	
$2x + x + x$	
$2x + 2x + x$	
$2x + 2x + x + x$	
$2x + 3x$	
$2x - 3x$	
$2x - 2x$	

Spot the pattern! What happens to the **coefficients** as each term is added or subtracted?

What happens to the **variables** as each term is added or subtracted?

6.7.2: Powers with Variable Bases (continued)

<u>Input</u>	<u>Answer/Output</u>
$(x)(x)$	
$(x)(x)(x)$	
$(x)(x)(x)(x)$	
$(x)(2x)$	
$(x)(3x)$	
$(x)(4x)$	
$(x)(-5x)$	
$(2x)(2x)$	
$(2x)(-2x)$	
$(2x)(3x)$	
$(2x)(-3x)$	
$(2x)(5x)$	
$(2x^2)(2x)$	
$(2x^2)(-2x)$	
$(2x^2)(-5x)$	

Spot the pattern! What happens to the **coefficients** as each term is multiplied?

What happens to the **variables** as each term is multiplied?

6.7.3: Practice

The process of distributing through the brackets is called "expansion" or "distribution."

Expand the following:

1. $2x(x + 4)$

2. $3x(x^2 + 2x)$

3. $4x(3x^2 + 2x - 5)$

4. $-3a(a^2 - 4a)$

5. $5x^2(3x - 4)$

6. Check your understanding

Three students were asked to expand this expression: $x(x^2 - 2x + 3x)$

Kevin's answer	Sal's answer	Ari's answer
$x(x^2 - 2x + 3x)$ $= x^3 - 2x^2 + 3x^2$	$x(x^2 - 2x + 3x)$ $= x(x^2 + x)$ $= x^3 + x^2$	$x(x^2 - 2x + 3x)$ $= x^3 - 2x^2 + 3x^2$ $= x^3 + x^2$

Which solution is the most efficient?

Explain your choice.

6.7.3: Practice (continued)

Expand the following:

7. Expand and simplify.

(a) $r(r + 2)$

(b) $2c(c^2 - 5c + 6)$

(c) $3x(2x^2 - 4x - 3)$

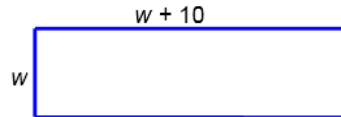
(d) $2x(x^2 + 3x) + x(3x - x^2)$

(e) $d(d^2 - 2d) - d^2(d - 5)$

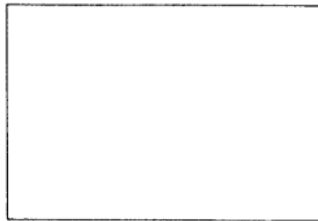
(f) $3(x^2 - 5x - 6) - 2x(x^2 - 8)$

6.8.2: Solving Measurement Problems

Problem A: Sam makes rectangular paving stones that are 10 cm longer than they are wide.



- Determine a formula for the **perimeter** in terms of w .
(Hint: formula for finding the perimeter of a rectangle is $P = 2(l + w)$)
- Use this formula to calculate the perimeter when the width is 6.75 cm.
- Use a graphing calculator to graph the equation describing the perimeter.
 - Write the equation you entered: $Y = \underline{\hspace{2cm}}$
 - Sketch a graph in the space provided below.

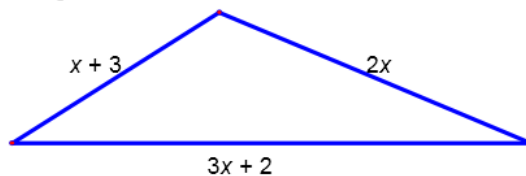


WINDOW Xmin = Xmax = Xscl = Ymin = Ymax = Yscl = Xres =

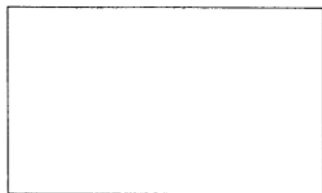
- Trace to locate the (width, perimeter) corresponding to the calculation in question 2.
 $X = \underline{\hspace{1cm}}$ $Y = \underline{\hspace{1cm}}$
- Use the formula to calculate the width when the perimeter is 60 cm.

6.8.2: Solving Measurement Problems (continued)

Problem B: This diagram shows the size of the sides in terms of x .



- Determine a formula for the perimeter in terms of x .
(Hint: formula for finding the perimeter of a triangle is $P = a + b + c$)
- Use this formula to calculate
 - the perimeter when x is 3 cm
 - the length of each of the sides when $x = 3$.
- Use the graphing calculator to graph the equation describing the perimeter.
 - Write the equation you entered: $Y = \underline{\hspace{2cm}}$
 - Sketch a graph in the space provided below.

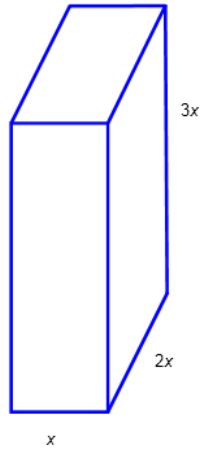


WINDOW
Xmin =
Xmax =
Xscl =
Ymin =
Ymax =
Yscl =
Xres =

- Use Trace to locate the point $(x, \text{perimeter})$ corresponding to the calculation in question 2a). You can also use $[2^{\text{nd}}]$ TABLE (over the GRAPH key) to see the table of values.
 $X = \underline{\hspace{1cm}}$ $Y = \underline{\hspace{1cm}}$
- Use the formula to calculate the value of x when the perimeter is 41 cm.

6.8.2: Solving Measurement Problems (continued)

Problem C: Explain how this model shows that the length is 2 times the width and the height is 3 times the width.



1. Determine a formula for the volume.

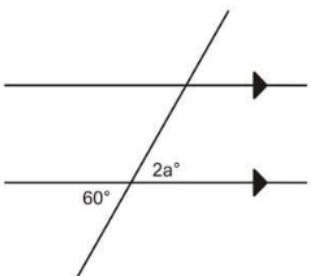
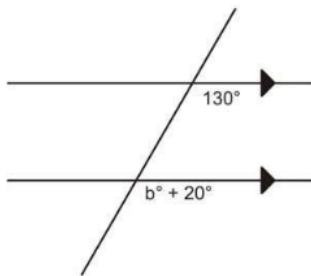
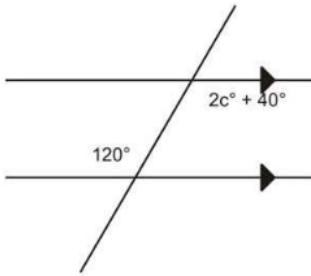
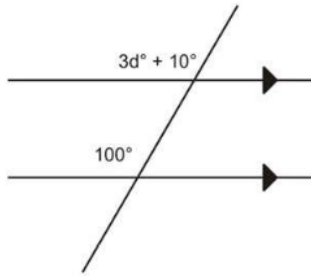
2. Use this formula to calculate the volume when the width is 225 m.

Challenge

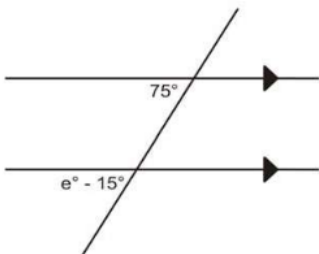
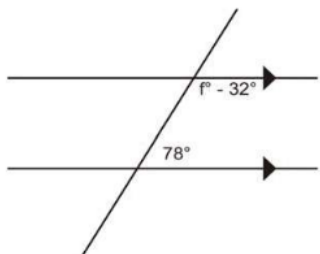
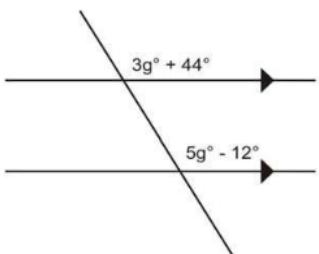
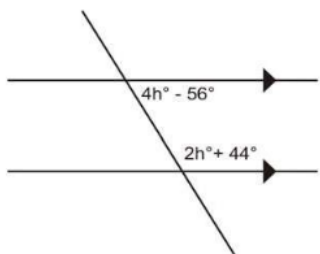
Can you find the width of the shape that has a volume of 162 cm^3 ?

6.8.3: Connecting Algebra to Geometry

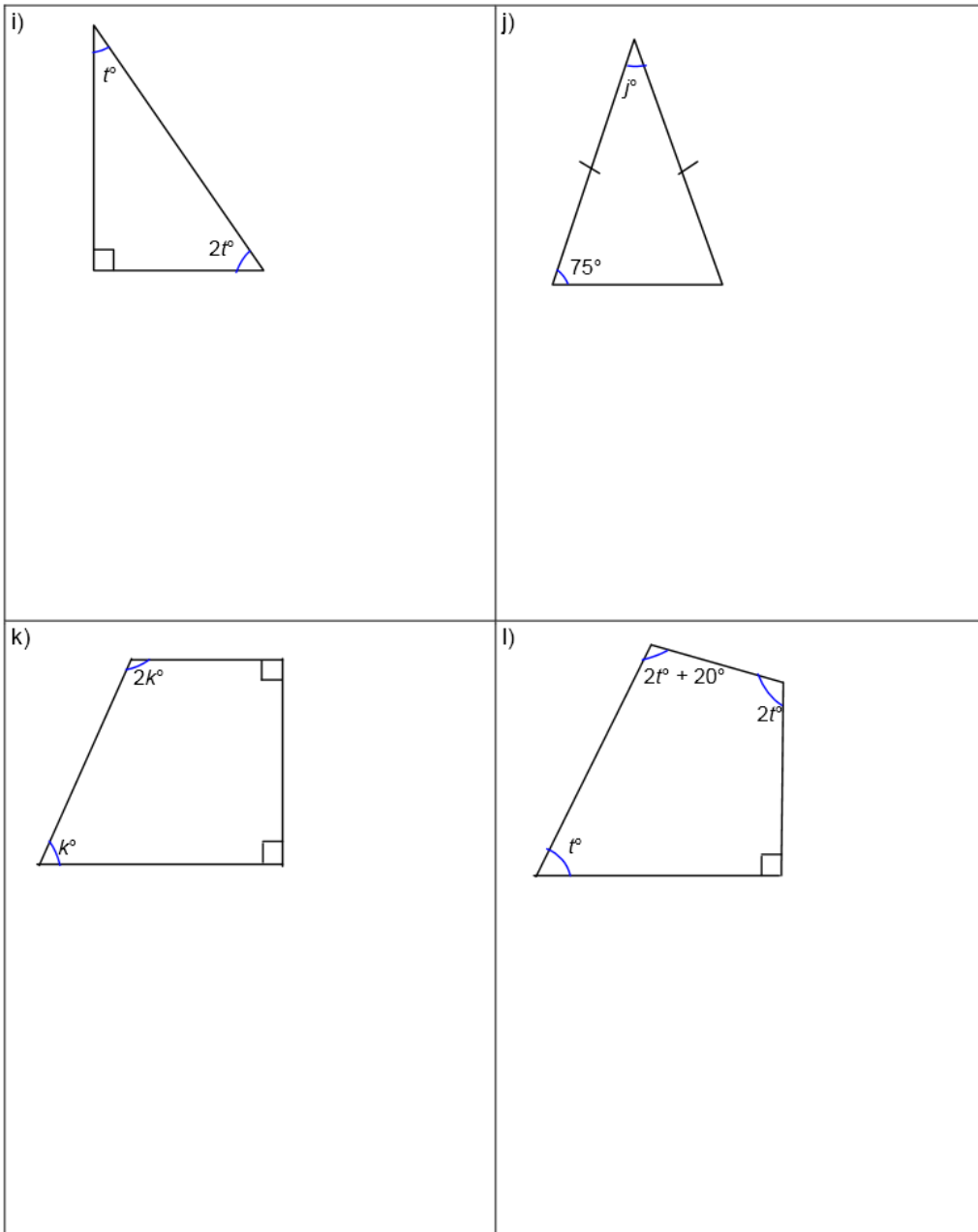
1. Write an equation and solve for the unknown. State the theorem used to make the equation.

<p>a)</p> 	<p>b)</p> 
<p>c)</p> 	<p>d)</p> 

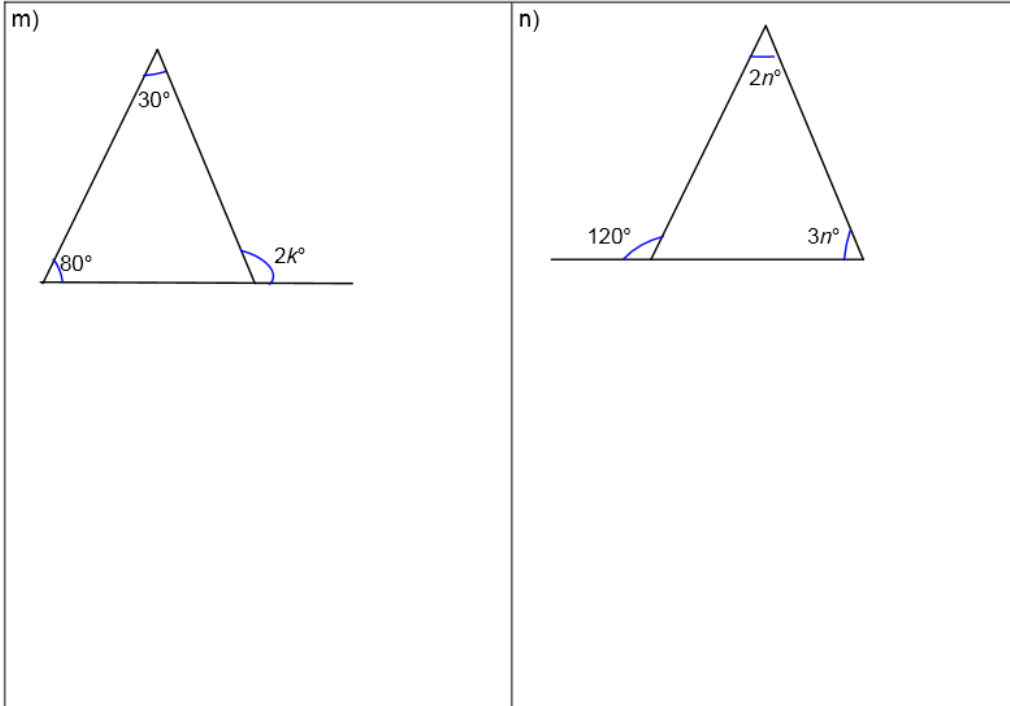
6.8.3: Connecting Algebra to Geometry (continued)

<p>e)</p>  <p>Diagram e) shows two parallel horizontal lines intersected by a transversal. The top-right angle is 75° and the bottom-left angle is $e^\circ - 15^\circ$.</p>	<p>f)</p>  <p>Diagram f) shows two parallel horizontal lines intersected by a transversal. The top-right angle is $f^\circ - 32^\circ$ and the bottom-right angle is 78°.</p>
<p>g)</p>  <p>Diagram g) shows two parallel horizontal lines intersected by a transversal. The top-right angle is $3g^\circ + 44^\circ$ and the bottom-right angle is $5g^\circ - 12^\circ$.</p>	<p>h)</p>  <p>Diagram h) shows two parallel horizontal lines intersected by a transversal. The top-right angle is $4h^\circ - 56^\circ$ and the bottom-right angle is $2h^\circ + 44^\circ$.</p>

6.8.3: Connecting Algebra to Geometry (continued)

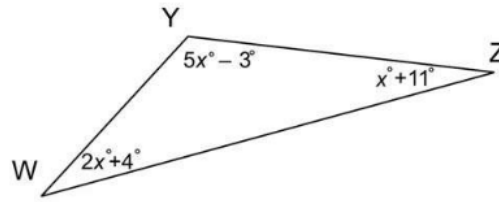


6.8.3: Connecting Algebra to Geometry (continued)



6.8.3: Connecting Algebra to Geometry (continued)

2. a) The sum of the interior angles in a triangle is:

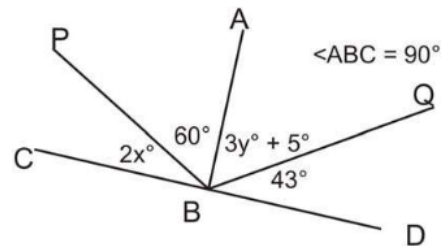


- b) An equation that models the sum of the interior angles in this triangle is:

- c) Solve the equation to determine the value of x .

- d) Use the value of x to calculate the size of:
 $\angle W$: $\angle Y$: $\angle Z$:

3. a) The sum of the angles in a right angle is:



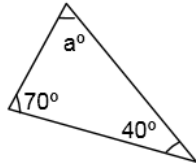
- b) Write 2 equations to model the sums of the 2 sets of angles that add to 90° :
 (i)
 (ii)

- c) Solve these equations to determine the values.
 (i) solve for x° (ii) solve for y°

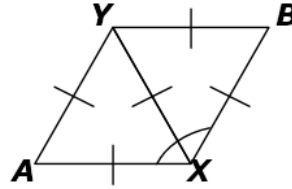
- d) Use the values of x and y to calculate the size of:
 $\angle CBP$: $\angle ABQ$:

6.8.4: Practice

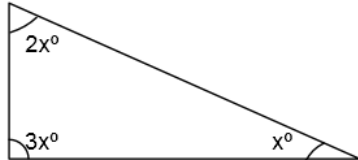
1. Find the value of a .



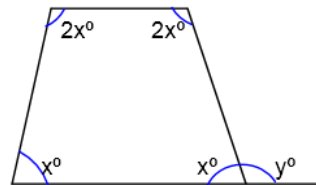
2. Find the value of $\angle AXB$.



3. Find the value of each angle.

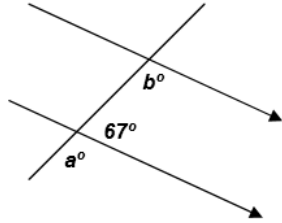


4. Solve for x and y .

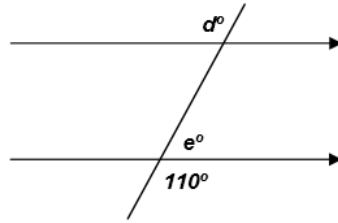


6.8.4: Practice (continued)

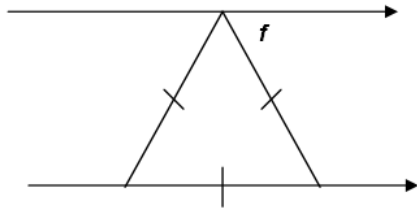
5. Find the values of a and b .



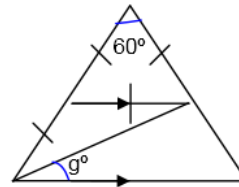
6. Find the value of the missing angles.



7. Solve for f .



8. Determine the value of g .



REVIEW QUESTIONS (Number Sense and Algebra)See Website for instructions and answers

Question 1	Building Reward		Question 2	Building Reward		Question 3	Building Reward	
	S: 1	M: 2		S: 1	M: 2		S: 2	M: 2
Evaluate $\left(\frac{2}{3}\right)^3$			Expand $4(2x - 3)$			Evaluate the following expression when $x = 4$ $5x^2 - 2x$		

Question 4	Building Reward		Question 5	Building Reward		Question 6	Building Reward	
	S: 4	M: 5		S: 2	M: 3		S: 5	M: 5
If the perimeter of a rectangle is 59 cm and the width is 12 cm, determine the length.			Solve for x. $6x + 2 = -10$			Expand and simplify $2(k^2 - 3k + 4) - (k^2 - 5)$		

Question 7	Building Reward		Question 8	Building Reward		Question 9	Building Reward	
	S: 2	M:3		S: 3	M: 3		S: 3	M: 3
<p>Expand.</p> $2x(5x^2 - 3x + 2)$			<p>Simplify</p> $-3u + 2 - u^2 - 5 + 7u + 2u^2 - 3$			<p>A rocket is fired upward from the ground. The equation $h = 60t - 5t^2$ shows the relationship between, h, the height of the rocket above the ground in m, and t, the time in seconds. Find the height of the rocket after 7 seconds.</p>		

REVIEW QUESTION (Number Sense and Algebra)

Question 10	Building Reward		Question 11	Building Reward		Question 12	Building Reward	
	S: 2	M: 3		S: 4	M: 3		S: 3	M: 4
<p>The formula</p> $B = 100 - \frac{h}{156}$ <p>gives water's boiling point, B, in degrees Celsius at an altitude of h metres.</p> <p>What is the approximate boiling point of water at an altitude of 5951 m?</p>			<p>Solve for x.</p> $2x + 7 = 6x - 1$			<p>Jennifer's earnings are calculated according to the formula: Earnings = $7t + \frac{d}{20}$, where t is the number of hours Jennifer works and d is the dollar value of the clothes she sells in the week. One week, Jennifer works for 15 h and sells \$980 worth of clothes. How <u>much</u> does she earn?</p>		

Question 13	Building Reward		Question 14	Building Reward		Question 15	Building Reward	
	S: 5	M: 6		S: 4	M: 5		S: 5	M: 5
Solve for n. $4(2n - 5) = 5n + 10$			Expand and simplify. $2(3x^2 - 5x) + 4x(7 + x)$			The area of a square room is 196 m^2 . Find the dimensions of the room and its perimeter.		

Question 16	Building Reward		Question 17	Building Reward		Question 18	Building Reward	
	S: 7	M: 8		S: 8	M: 8		S: 5	M: 4
<p>a) Find a simplified expression for the area of the rectangle.</p> <div style="display: flex; align-items: center; margin-left: 40px;"> <div style="margin-right: 10px;">$4x$</div> <div style="border: 1px solid black; padding: 5px;"> $3x - 2$ </div> </div>			<p>A field in the shape of a trapezoid has a perimeter of 365 m. A fence is being built along the field's perimeter. Determine the length of fencing needed for each side of the field.</p> <div style="display: flex; align-items: center; margin-left: 40px;"> <div style="margin-right: 10px;">$4(x+2)$</div> <div style="border: 1px solid black; padding: 5px;"> $6(x - 3)$ $3x$ $5x - 3$ </div> </div>			<p>Solve for x.</p> $7 - 4x = -17 + 2x$		
<p>b) Calculate the area if $x = 4$ cm.</p>								

EQAO Questions

1. Calculate $7^2 + 6 - 8 \div 2 + 2$.
 - a 18
 - b 49
 - c 50
 - d 53

2. Which of the following expressions is equal to 49?

F $(4 + 3)^2$

G $4 + 3^2$

H $(3 + 4^2)$

J $3^2 + 4^2$

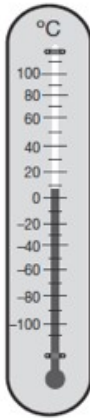
3. The formula

$$B = 100 - \frac{h}{156}$$

gives water's boiling point, B , in degrees Celsius at an altitude of h metres.

What is the approximate **boiling point of water** at an altitude of 5951 m?

- A 38 °C
- B 62 °C
- C 96 °C
- D 156 °C



4. Which of the following fractions is **not** equivalent to $\frac{10}{30}$?

a $\frac{2}{6}$

b $\frac{15}{35}$

c $\frac{1}{3}$

d $\frac{100}{300}$

5. Expand and simplify the following expression:

$$3(2y + 4) - 12 = 3(6y) - 12$$

a 6

b 6y

c 6y - 8

d 18y - 12

0

$$= 18y - 12$$

6. Herman uses his scientific calculator to determine the value of the expression $\frac{4}{3}\pi(3.5)^3$.

What is the approximate value of this expression?

A 175.0

B 175.1

C 179.0

D 179.6

$$4 \div 3 = \underline{\quad} \times 3.14 = \underline{\quad} \times (3.5)^3$$

7. Which of the following is equivalent to the expression below?

$$(4x - 5) + (2x + 1) = \underline{4x} - 5 + \underline{2x} + 1$$

a $2x - 6$

b $2x - 4$

c $6x - 6$

d $6x - 4$

$$= 4x + 2x - 5 + 1$$

$$= 6x - 4 \quad -6$$

8. What is the value of the expression

$$-1 + \frac{77}{100}?$$

a $-\frac{177}{100} =$

b $-\frac{78}{100} =$

c $-\frac{76}{100} =$

d $-\frac{23}{100} =$

$$-1 + 0.77 = -0.3333$$

$$\begin{aligned} -\frac{1}{1} + \frac{77}{100} &= -\frac{100}{100} + \frac{77}{100} \\ &= \frac{-100+77}{100} \end{aligned}$$

9. A rocket is fired upward from the ground. The equation below shows the relationship between h , the height of the rocket above the ground in metres, and t , the time in seconds.

$$h = 60t - 5t^2$$

Which of the following is the height of the rocket after 4 seconds?

a 35 m

b 44 m

c 160 m

d 240 m

$$h = 60(4) - 5(4)^2$$

10. A tap is leaking into a pail. The height of the water in the pail is represented by the equation $h = 0.5t + 2$, where h represents the height of water in the pail, in cm, and t represents the amount of time the tap has been leaking, in minutes.

What is the height of water in the pail if the tap has been leaking for 56 minutes?

- a 28 cm
- b 30 cm**
- c 108 cm
- d 114 cm

$$\begin{aligned}h &= 0.5t + 2 \\h &= 0.5(56) + 2 \\&= 30\end{aligned}$$

11. What is the solution to the equation
 $3x + 80 = 12x - 1$?

a -27

b -9

c 9

d 27

$$3x - 12x = -1 - 80$$

$$\frac{-9x}{-9} = \frac{-81}{-9}$$

$$x = 9$$

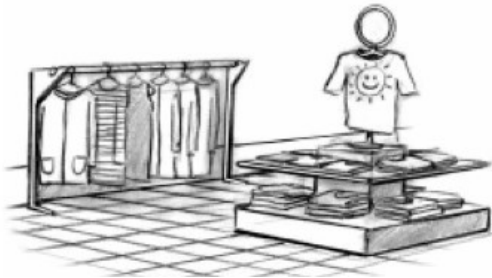
12. Stephen's earnings are calculated according to the formula

$$\text{Earnings} = 7t + \frac{d}{20}$$

where t is the number of hours Stephen works and d is the dollar value of the clothes he sells in the week.

One week, Stephen works for 15 h and sells \$980 worth of clothes. How much does he earn?

- a \$54.25
- b \$105
- c \$154
- d \$176



13. Ivan shows his steps in solving the following equation for x :

$$2x + 3 = 7$$

Step 1: $2x + 3 - 3 = 7 - 3$

Step 2: $2x = 4$

Step 3: $x = 4 \times 2$

Step 4: $x = 8$

$$\begin{aligned} 2x + 3 &= 7 \\ 2x &= 7 - 3 \\ \frac{2x}{2} &= \frac{4}{2} \\ x &= 2 \end{aligned}$$

In which step has Ivan made an error?

F Step 1

G Step 2

H Step 3

J Step 4

14. A steel bar will expand when it is heated and contract when it is cooled. The relationship between the length of the bar, L , (mm) and the temperature, T , ($^{\circ}\text{C}$) is given by

$$L = 5000 + 0.12(T - 20).$$

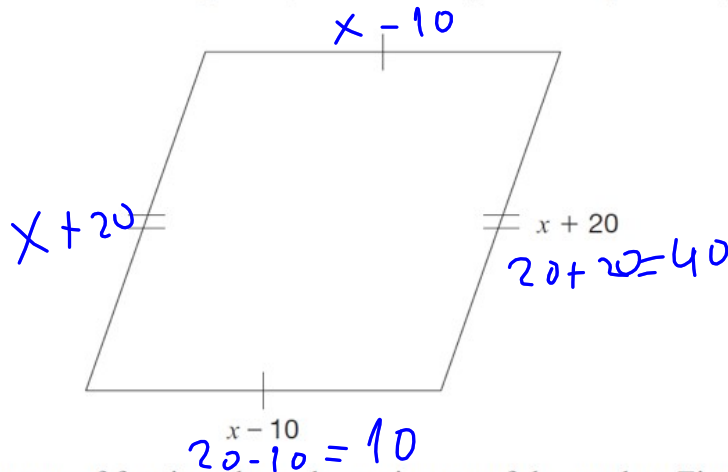
What is the length of the steel bar when the temperature is 45°C ?

- a 5001 mm
- b 5002 mm
- c 5003 mm
- d 5004 mm

15.

Fabulous Fencing

Pauline builds a fence around her garden, which is shaped like a parallelogram, as shown below.



Pauline uses 100 metres of fencing along the perimeter of the garden. Find the dimensions of her garden. Show your work.

$$P = l + w + l + w$$
$$P = \underbrace{x - 10}_{\text{red}} + \underbrace{x + 20}_{\text{green}} + \underbrace{x - 10}_{\text{red}} + \underbrace{x + 20}_{\text{green}}$$
$$100 = 4x + 20$$
$$100 - 20 = 4x$$
$$80 = 4x$$
$$x = 20$$

16. Expand and simplify.

$$2(3x^2 - 5x) + 4x(7 + x)$$

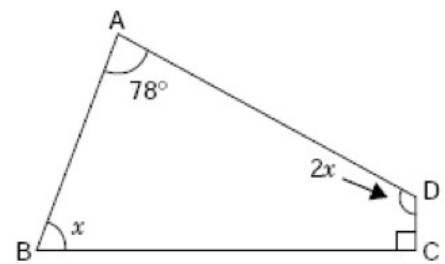
17.

Marco is designing a new sail for his windsurfer.

He uses the quadrilateral below as the design of one part of the sail.

- a) Determine the value of x in the quadrilateral by solving the equation.

$$78 + x + 2x + 90 = 360$$



18. Pick up your prize for the contest.

Solve the **equation** below to find the number of the prize room:

$$3(2x - 9) - 4x = 13$$

19. The total number of laps Tessa has run, l , after any number of days, n , is given by the formula

$$l = \frac{n(n+1)}{2}$$

Use this formula to determine **the total number of laps** Tessa will have run after **30 days**.

