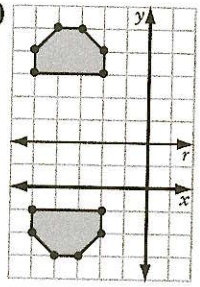
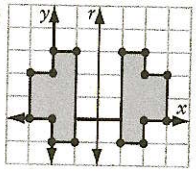
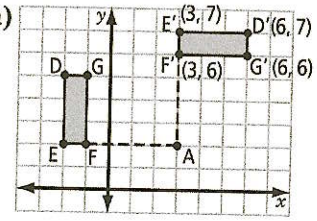
Workbook Answers

1 Get Ready

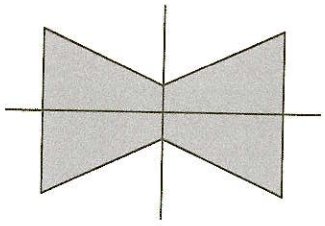
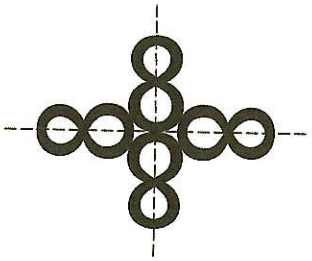
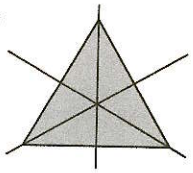
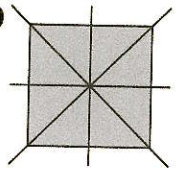
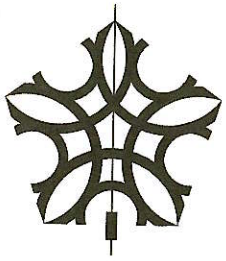
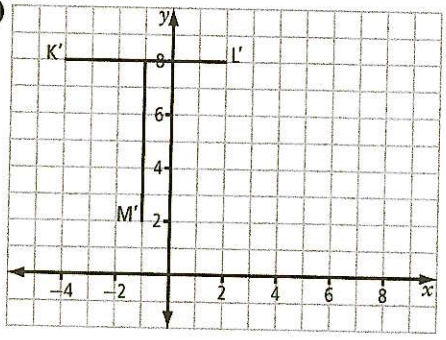
1. Triangle ABC is translated 4 units up.
2. P'(3, 3)
3. a) 

b) 

4. a) 

b) a 270° counter-clockwise rotation
5. 286 cm²
6. a) 5 b) 3

1.1 Line Symmetry

1. True
2. False. Example: An isosceles triangle has one line of symmetry.
3. True
4. False. Examples: A shape that has a line of symmetry is symmetrical. A shape that does not have a line of symmetry is asymmetrical.
5. False. Example: A curved shape may have lines of symmetry.
6. 
7. Example:

8. 
Three lines of symmetry
9. a) 
Four lines of symmetry
b) Two lines are oblique.
10. a) There are none.
b) 
One line
11. a) K(2, 8), L(8, 8), M(5, 2)
b) 

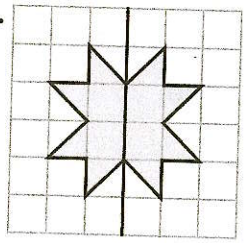
c) K'(−4, 8), L'(2, 8), M'(−1, 2)
d) Yes. They show symmetry along a vertical line.
e) $x = 2$

Chapter 1 Review

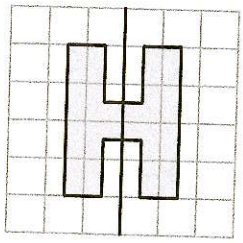
1. a) rotational symmetry

b) horizontal, vertical, and rotational symmetry

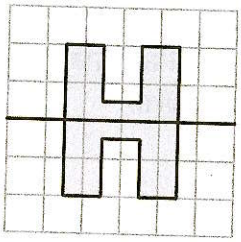
2.



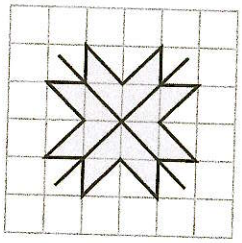
3. a) Example: A type of symmetry where an image can be divided into two identical reflected halves by a vertical line of symmetry.



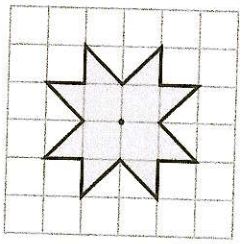
b) Example: A type of symmetry where an image can be divided into two identical reflected halves by a horizontal line of symmetry.



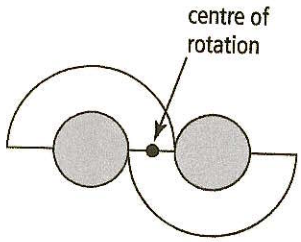
c) Example: A type of symmetry where an image can be divided into two identical reflected halves by a diagonal line of symmetry.



d) Example: A type of symmetry where an image can be turned about its centre of rotation so that it fits onto its outline more than once in a complete turn.

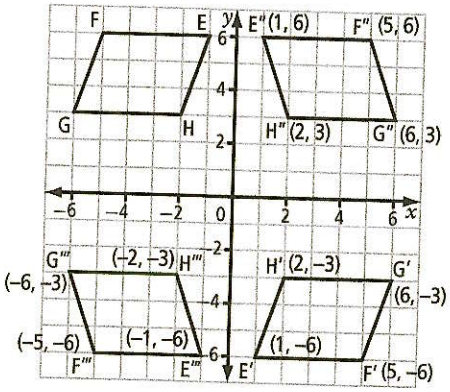


4. a) rotation symmetry



b) This design is not symmetrical. Example: To give the design symmetry, reflect a row of cats. The two rows of cats would then have symmetry along the line of reflection.

5. a)–b)



6. a) 167.5 m² **b)** 277.7 m²

7. a) 128.425 m² **b)** 1285

9. Examples:

$1 - \frac{2}{5} - \frac{1}{3} = \frac{4}{15}$ h,

$60 - \left(\frac{2}{5} \times 60\right) - \left(\frac{1}{3} \times 60\right) = 16$ min

10. $495 **11.** 9.6 m

2.4 Determining Square Roots of Rational Numbers

1. d) **2.** e) **3.** b) **4.** c) **5.** a)

6. a) Any rational number between 25 and 36 is correct. Example: 26

b) Any rational number between 9 and 16 is correct. Example: 12

7. a) 4, 4.84 **b)** 81, 75.69

c) 121, 127.69 **d)** 1, 0.8464

8. a) 196 cm², 216.09 cm² **b)** 4 km², 5.29 km²

9. a) Yes, both 4 and 9 are perfect squares.

b) $0.4 = \frac{4}{10}$. No, 10 is not a perfect square.

c) $0.81 = \frac{81}{100}$. Yes, both 81 and 100 are perfect squares.

d) No, 2 is not a perfect square.

10. a) $0.16 = \frac{16}{100}$. Yes, both 16 and 100 are perfect squares.

b) No, 90 is not a perfect square.

c) $0.001 = \frac{1}{1000}$. No, 1000 is not a perfect square.

d) $\frac{8}{18} = \frac{4}{9}$. Yes, both 4 and 9 are perfect squares.

11. a) 17 **b)** 0.19 **c)** 35 **d)** 2.3

12. a) 1.5 cm **b)** 19 m

13. a) 5, 6 **b)** 7, 8 **c)** 0.4, 0.5 **d)** 0.8, 0.9

14. a) 5.5 **b)** 7.2 **c)** 0.42 **d)** 0.88

15. 2.3 m **16.** 7.5 cm

17. No, the sides of the room are $\sqrt{15}$ m or approximately 3.87 m, which is larger than the width of the carpet roll.

2 Chapter Link

1. 9 h

2. a) $\frac{9}{10}$, 7.5, $\frac{3}{4}$, 6 h 30 min, $\frac{2}{3}$, $4\frac{2}{8}$, $\frac{4}{9}$ **b)** Saturday

3. a) Example: Estimated bed area of 4 m² is less than the area of the room, so it will fit. Room sides are about 1.45 m longer than the bed, so it will fit.

b) Both the flower rug and the geometric rug have sides longer than the bed but shorter than the room.

4. 1 h 25 min

2 Vocabulary Link

Across

6. non-perfect square

Down

1. equivalent numbers

2. parentheses

3. quotient

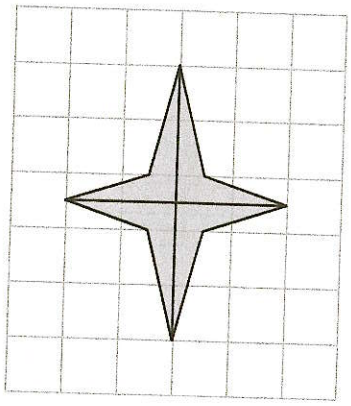
4. rational number

5. perfect square

Chapters 1–2 Review

1. $3\frac{2}{5}$, -2, $\frac{7}{4}$, -0.7, $1\frac{1}{3}$, 2.5

2. Vertical, horizontal, and rotational symmetry of order 2 with an angle of rotation measuring 180°



3. a) < **b)** = **c)** > **d)** > **e)** =

3.3 Order of Operations

1.

Expression	Coefficient	Power	Repeated Multiplication	Value
$-3(7)^2$	-3	7^2	$-3 \times 7 \times 7$	-147
$2(5)^4$	2	5^4	$2 \times 5 \times 5 \times 5 \times 5$	1250

2. Step 1 c), Step 2 a), Step 3 d), Step 4 b)

3. a) 108 **b)** 32 **c)** 700 000 **d)** -108

4. a) $2(3)^3$ **b)** $5(-7)^5$ **c)** $-2(8)^4$ **d)** $6(9)^5$

5. a) 16 **b)** -17 **c)** 3 **d)** 0.7

6. Example: In Step 2, Juan should have multiplied 8 by 8, not by 2. The correct answer is 140.

7. a) -199 **b)** 225

c) undefined; cannot divide by 0 **d)** 20

8. a) 136 **b)** 73

9. 216 mm^2 **10.** -233

11. a) $-5^2 = -25$, $(-5)^2 = 25$

b) Example: The expression -5^2 has an exponent of 2, a base of 5, and a coefficient of -1, so evaluating the power and then multiplying by the coefficient gives an answer of -25. The expression $(-5)^2$ has an exponent of 2, a base of -5, and a coefficient of 1, so the expression has a value of 25.

3.4 Using Exponents to Solve Problems

1. False. A power in a formula represents repeated multiplication.

2. True

3. False. Patterns involving repeated multiplication can be modelled by an expression that contains only powers.

4. 864 cm^2 **5.** 5 mm

6. a) $100(2)^n$ **b)** 3200 **c)** 102 400

7. 2 m **8.** 15.1 cm^2 **9. a)** $6s^2$ **b)** $h^2 = a^2 + b^2$ **c)** s^3

10.

Power(s)	Base(s)	Exponent(s)	Coefficient
a) s^2	s	2	6
b) h^2	h	2	1
a^2	a	2	
b^2	b	2	
c) s^3	s	3	1

11. a) 3.38 m^2 **b)** 22.5 m^2

3 Chapter Link

1.

Time (h)	Population of Bacteria in Sample	
	A	B
0	50	600
1	150	1 200
2	450	2 400
3	1 350	4 800
4	4 050	9 600
5	12 150	19 200
6	36 450	38 400
7	109 350	76 800
8	328 050	153 600

2. a) A, 6 **b)** $50(3)^6$ **c)** 50

3. a) $50(3)^n$ **b)** $600(2)^n$

4. Example: Shortly after hour 6, the populations would be equal since the population of Sample A overtakes that of Sample B during hour 7.

5. a) $600(2)^5 - 50(3)^5$ **b)** 7050

6. a) $50(3)^n + 600(2)^n$ **b)** 74 850 **c)** 3 566 850

3 Vocabulary Link

Across

6. exponential form

Down

1. factored form

2. power

3. exponent

4. base

b) Example: I measured the various parts of the butterfly, multiplied that measurement by 4, and then drew the part in the new measurement. For example, the body is 5.5 mm long. I drew the larger body 22 mm long.

6.

7. a) enlargement

b) approximately 1:2.3. Example: If you measure the A in the newspaper headline and the A in the poster headline, you can find the scale factor.

4.2 Scale Diagrams

1. d) **2.** c) **3.** b) **4.** a)

5. a) divide 85 by 5, then multiply 1 times the answer **b)** divide 132 by 6

6. a) 121.5 **b)** 4 **7. a)** 130.2 cm **b)** 2 mm

8. a) $\frac{1}{7.5}$ **b)** $\frac{1}{4}$ **9. a)** $\frac{1}{16.\overline{3}}$ **b)** $\frac{1}{13\,333.\overline{3}}$

10. a) approximately 1:206 or 1:207, depending on how you measure

b) The scale drawing should be 1.1 cm by 1.5 cm.

c) 1.65 cm²

4.3 Similar Triangles

1. a) angles **b)** sides

2. scale factor, proportion

3. a) Yes. They are similar because the corresponding angles are equal and the corresponding sides are proportional.

b) No. The angles are not equal and the sides are not proportional.

4. a) ∠A and ∠J, ∠B and ∠K, ∠C and ∠L; AB and JK, BC and KL, AC and JL

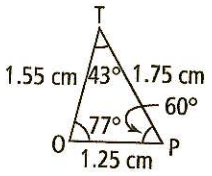
b) ∠P and ∠M, ∠Q and ∠N, ∠R and ∠L; PQ and MN, PR and ML, QR and NL

5. △PQR and △VWX are similar. Example: They are both isosceles right triangles with 45° angles on the legs. Corresponding sides are proportional.

6. No. Example: They are not similar because the corresponding sides are not proportional.

7. a) $x = 21$ **b)** $x = 13.8$

8. Example: Triangle reduced by half.



9. 167 cm

4.4 Similar Polygons

1. False. Polygons that are similar have all corresponding angles equal in measure.

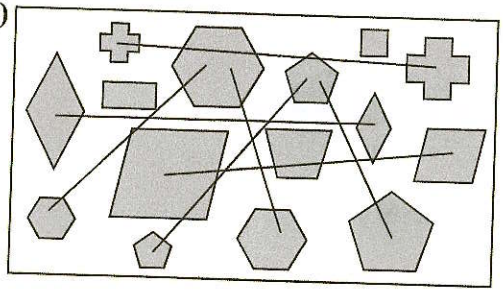
2. False. Example: You can use similar polygons to determine unknown side lengths.

3. False. A polygon is a two-dimensional closed figure made of three or more line segments.

4. a) Yes. Example: They are similar because all side lengths are proportional with a scale factor of 2.

b) Yes. Example: All side lengths are proportional with a scale factor of 1.7.

5. a)



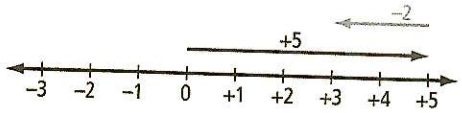
b)

c) Examples:

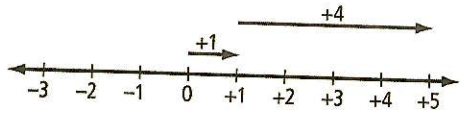
6. a) $x = 1.7$ **b)** $x = 2.25, y = 12$

5 Get Ready

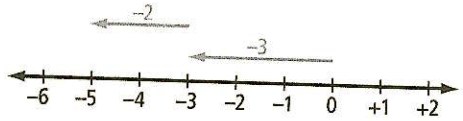
1. a) +3



b) +5



c) −5



2. a) $(-2) + (+5) = +3$ **b)** $(-1) + (-2) = -3$
c) $(-3) + (+7) = +4$

3. a) +5 **b)** −4 **c)** −13 **d)** +2

4. a) +4 **b)** −5 **c)** +3 **d)** +10

5. a) NC: 2, V: x, C: −7
b) NC: −3, V: b, C: +5
c) NC: 1, V: t, C: −4
d) NC: −6, V: r, C: +3

6. Examples:
a) $s - 5$, where s is Sarah's sister's age
b) $2l - 3$, where l is the length
c) $p + 14$, where p is the perimeter of the triangle
d) $\frac{1}{2}n$ or $\frac{n}{2}$, where n is the number of tickets the school expected to sell

7. a) $p + p + p + p$ or $4p$
b) Example: The length of the rectangle is 8 units more than its width.

5.1 The Language of Mathematics

1. symbols, variables

2. polynomial, monomial, binomial, trinomial

3. exponents, highest

4. a) 2; binomial **b)** 1; monomial **c)** 3; trinomial
d) 4; polynomial

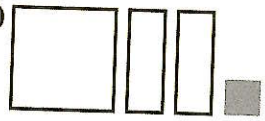
5. a) 2; 2 **b)** 2; 2 **c)** 1; 0 **d)** 2; 3

6. a) $4c^2 - 3c + 2$, $g + h + j$
b) $4c^2 - 3c + 2$, $5p^2 - r$, $4ab$ **c)** −12
d) $4ab$, −12 **e)** $4c^2 - 3c + 2$, $4ab$

7. a) $x^2 + x - 4$ **b)** $-2x^2 - 3$ **c)** $x^2 - 3x$

8. a)

b)



9. a) $x^2 + 7$ **b)** $3x - 9$ **c)** $4x$

10. a) $5n$ **b)** $w(w + 5)$ or $w^2 + 5w$ **c)** $0.8x + 40$

5.2 Equivalent Expressions

1. a) a, b **b)** −7; 1 for w, 2 for x **c)** No

2. x^2 should be circled in each term; $-2x^2$

3. No. They are not like terms because either the variables differ or the exponents of the variables differ.

4. a) 1; 1 **b)** −3; 1 **c)** 6; 2 **d)** no value; 0
e) −1; 2 **f)** 1; 2

5. a) $-cd$, $-xy$ **b)** $-cd$, $-xy$, $-3jk$ **c)** k^2
d) $9r$, $4x$

6. a) $3r$, $-r$ **b)** $-4y$, $0.3y$, $\frac{y}{2}$ **c)** cd, $6cd$

7. Examples:
a) $5c^2 - c^2 - 5c + c + 9 - 8$
b) $3m^2 + 2m^2 + 8m - 6m - 9 + 6$
c) $6d^2 - 5d^2 - 8d + 3d + 7 - 2$

8. The order of the terms may vary.
a) $-b^2 + 5b^2 + 6 - 8 + 9$; $4b^2 + 7$
b) $4t^2 - 3t^2 + 7t + 6t - 5 + 14$; $t^2 + 13t + 9$
c) $-2n^2 - 3n^2 + 9n + 5n + 3 - 7$; $-5n^2 + 14n - 4$
d) $3y^2 - 6y^2 + 3y + 2y + 4 - 6 - 5$; $-3y^2 + 5y - 7$

9. $3b + 6$

6 Get Ready

1. a)

Time, t (h)	Distance, d (km)
0	5
2	8
4	10

b)

Time, t (s)	Speed, s (km/h)
5	60
6	50
7	40

2. a) Yes. Example: It makes sense because there can be times and temperatures between the ones labelled on the graph.

b) No. Example: It does not make sense because you can sell only whole hamburgers, not fractions of a hamburger.

3. a) This is a linear relation because the difference between the consecutive values in each row is the same (15 m in the first row and 2.1 m/s in the second row).

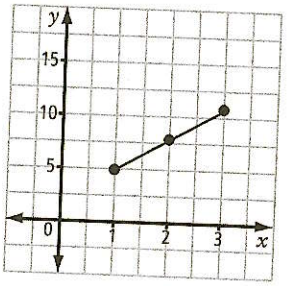
b) This is not a linear relation because the difference between consecutive values of h is not consistent even though the difference between consecutive values of t is consistent.

4. (60, 10.5)

5. Examples:

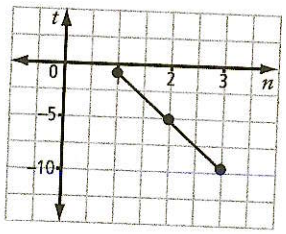
a)

x	y
1	5
2	8
3	11



b)

n	t
1	−1
2	−5
3	−9



6.1 Representing Patterns

1. a) pattern, four rails, posts

b) Example:

Number of Posts, p	Number of Rails, r
1	0
2	4
3	8
4	12

c) Example: To get r, multiply p by 4 and subtract 4.

2. a) equation **b)** Example: $4p - 4 = r$

c) Example: Substitute values of p from the table.

3. a)

Figure Number, f	Perimeter, p
1	8
2	14
3	20
4	26

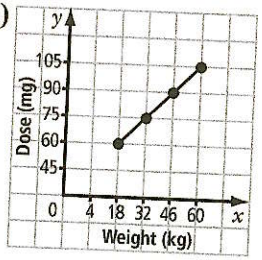
b) $6f + 2 = p$; f = figure number, p = perimeter

c)

Figure Number, f	Perimeter, p
5	32
6	38
7	44
8	50
9	56
10	62

7. Example:

a)

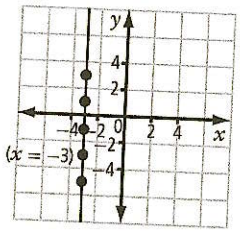


b) 40 kg: 85 mg; 100 kg: 190 mg

c) 50 mg: 8 kg; 120 mg: 74 kg

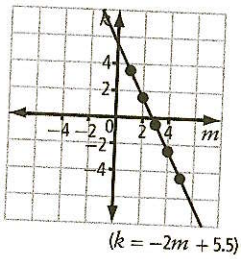
6.3 Graphing Linear Equations

1. equation
2. coordinate, linear relation
3. interpolate, extrapolate (in either order)
4. a) Example:



x	y
−3	−5
−3	−3
−3	−1
−3	1
−3	3

b) Example:



m	k
1	3.5
2	1.5
3	−0.5
4	−2.5
5	−4.5

5. a) $y = -2x + 0.25$ b) $y = -0.5x$
6. a) $y = 0.5x + 1.5$

b) Example: A line passes through points A to N; $y = 2x - 1$

c) Example: A line passes through points A, B, C, D, E, and F; $y = 1$

7. a) Example: $l = 1000 - \frac{99t}{60}$

b) Example: Approximately 450 min or 7.5 h; interpolation

c) Agree. Example: It takes about 7.5 h to pump out 750 L.

8. a) Example:

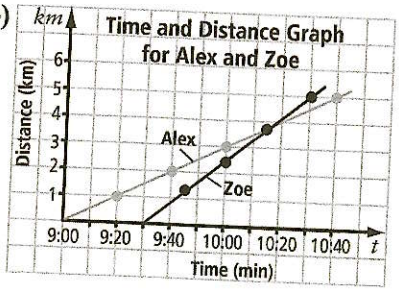
Alex

Time (min)	Distance (km)
9:20	1
9:40	2
10:00	3
10:20	4
10:40	5

Zoe

Time (min)	Distance (km)
9:45	1.25
10:00	2.50
10:15	3.75
10:30	5.00
10:45	6.25

b)



c) 10:15 a.m. d) 0.5 km

6 Chapter Link

1. Examples:

a) Air

Time, t (s)	Distance, d (m)
1	340
2	680
3	1020
4	1360
5	1700
6	2040
7	2380
8	2720
9	3060
10	3400

7. a) 13 **b)** 0.216

8. Error in step 1 ($-2^2 = 4$, not -4).
Correct answer: 154

9. 137.33 cm^2

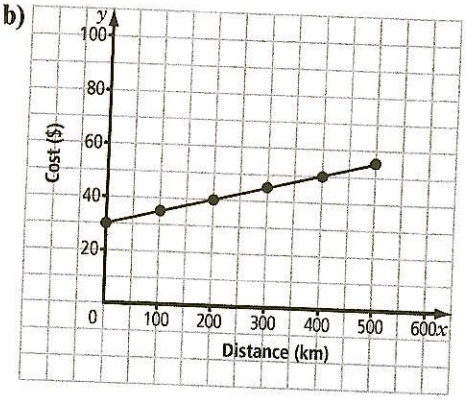
10. a) $5a^2 - 9a - 7$ **b)** $6x^2y - 7xy^2$

11. 4.6 cm

12. a)

Distance (km)	Cost ($)
0	30
100	35
200	40
300	45
400	50
500	55

b)



c) $42.50 **d)** 450 km

e) Example: $C = 0.05d + 30$, where C represents cost in dollars and d represents distance in km.

7 Get Ready

1. a) T; 2 **b)** B; 2 **c)** B; 1 **d)** M; 2

2. Examples: $3x^2 + 2y - 4x$, $3x + 2xy - 4y$

3. b) and d)

4. a) $3x^2 - 6x + 5$ **b)** $3p^2 - p + 2$

5. a) $7x - 10$ **b)** $2t^2 + 3t + 1$

6. a) -7 **b)** $y^2 + 5y - 2$

7. a) $3x^2 + 8x - 10$ **b)** $-y - 9$

7.1 Multiplying and Dividing Monomials

1. a) product; $-x$-tiles

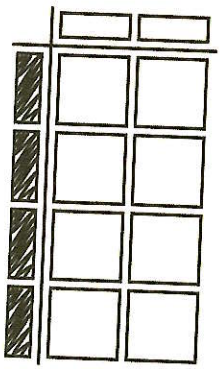
b) division; dividend; x-tiles

c) numerical coefficients; exponent rules

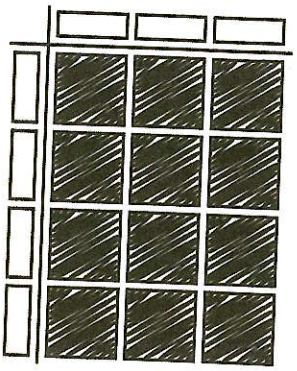
2. Example: To divide monomials algebraically, you can divide the numerical coefficients and then use the exponent rules to divide the variables.

3. Orientation of models may vary.

a) $-8x^2$

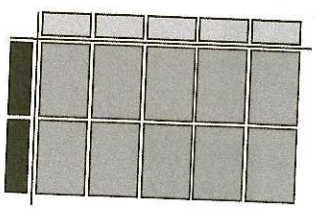


b) $12x^2$



4. a) $6x^2 \div (-3x) = -2x$ **b)** $9xy \div 3x = 3y$

5. a) $2x$



7 Chapter Link

1. a) $768y + 216$ units **b)** $32y + 9$ units
c) $512y^2 + 288y + 40.5$ units^3 **d)** 20 bundles
e) $12\,800y^2 + 7200y + 1012.5$ units^3

2. a) $(4374d^2 + 1458dp + 972d)$ units^2
b) $(81d^2 + 27dp + 18d)$ units^2

3. Example: A square carpet with side length $7.6a + 8.2$ m is cut into 4 square carpets of equal size. What are the side lengths of the smaller carpets?

Answer: $(7.6a + 8.2) \div 4 = (1.9a + 2.05)$ m

7 Vocabulary Link

Across

5. distributive property

Down

1. polynomial

2. monomial

3. spider map

4. binomial

Chapters 1–7 Review

1. a) $5x$; -20 **b)** $5x + y$; $2x^2 - xy$
c) $2x^2 - xy$; $7d^2 - 3cd - 5c + 6$ **d)** c and d
e) -20; $5 + c + d$; $7d^2 - 3cd - 5c + 6$ **f)** 5; none

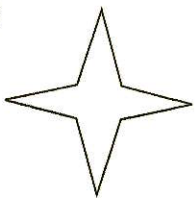
2. a) $y = 2x + 3$ **b)** $y = \frac{-3}{4}x$ or $-0.75x$ **c)** $y = 3$

3. a) $11x^3$ **b)** $15j^2 - 18j$

4. a) $-3x - 2y$ **b)** $32t + 16$

5. Example:

a)



b) 4 **c)** 4 **d)** 90°; $\frac{1}{4}$

6. a) 58.27 **b)** $-\frac{2}{15}$

7. a) 24 **b)** 3 145 728 **c)** 50 331 648

8.

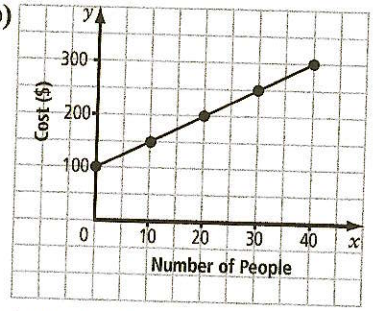
	$5x^2 + 4x + 20$	
$4x^2 + 2x + 9$		$-x^2 - 2x - 11$
$3x^2 + 2x + 5$	$-x^2 - 4$	$2x + 7$

9. a) $1.3m$ **b)** 8.62 cm **c)** $\frac{1}{3}$ m

10. a)

Number of People	Cost ($)
0	100
10	150
20	200
30	250
40	300

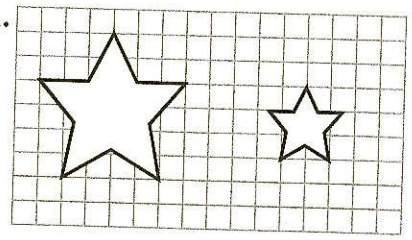
b)



c) \$225 **d)** 80

e) Example: $C = 5n + 100$, where C represents the total cost in dollars and n represents the number of people.

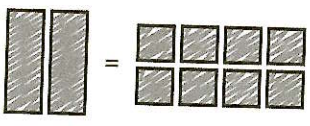
11.



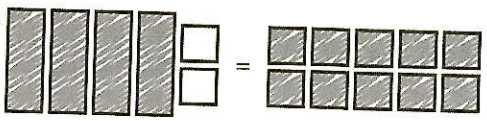
8 Get Ready

1. Examples:

a)



b)



5. a) $x = -\frac{3}{4}$ **b)** $c = \frac{10}{27}$ **c)** $x = \frac{13}{5}$ **d)** $w = \frac{7}{8}$

6. a) $x = 2.14$ **b)** $p = 0.56$ **c)** $m = -2.11$

7. a) $p = -4.5$ **b)** $x = -\frac{13}{5}$, $-2\frac{3}{5}$, or -2.6 **c)** $k = 3.7$

8. 8 weeks **9.** $x = 7.2$ **10. a)** 15.75 min **b)** 3.54 km

11. 19

8 Chapter Link

1. 2.5 km **2.** 283 km **3.** 157 km

4. No. Example: The left and right sides of $22.50 + 0.15d = 0.28d$ are not equal when d represents 170 km.

5. 49.09 km

8 Vocabulary Link

1. g) **2.** c) **3.** e) **4.** b) **5.** d) **6.** a) **7.** f)

G	K	D	Z	C	D	U	T	D	O	B	I	I	N	N	U	I	E	T	I
E	H	S	N	O	I	T	A	R	E	P	O	E	T	I	S	O	P	P	O
Z	I	I	V	L	R	N	D	I	H	S	U	Z	U	L	P	I	Q	J	M
J	B	W	A	J	K	Y	S	S	T	J	U	G	M	X	P	A	U	G	K
N	U	M	E	R	I	C	A	L	C	O	E	F	F	I	C	I	E	N	T
P	B	K	P	L	X	R	Z	T	F	X	W	A	E	T	O	D	A	C	E
O	I	A	I	P	Z	X	X	R	A	H	I	W	R	K	S	X	T	M	Q
D	V	I	F	A	Q	N	D	Z	I	I	N	O	W	I	K	I	N	I	L
U	B	L	R	B	V	M	M	R	F	B	B	M	T	P	C	W	T	N	K
D	N	O	A	L	A	V	Z	X	K	U	V	H	F	W	A	Q	E	O	Q
R	U	W	C	E	R	Y	E	P	D	T	F	G	X	J	L	H	I	I	D
D	I	S	T	R	I	B	U	T	I	V	E	P	R	O	P	E	R	T	Y
Z	Q	L	I	B	A	R	T	P	A	I	J	M	N	L	M	C	C	A	P
H	F	O	O	M	B	A	X	F	A	V	H	S	Y	E	K	O	V	U	E
I	L	I	N	X	L	K	F	W	N	P	T	K	Z	U	M	F	V	Q	A
O	E	X	B	I	E	R	I	Z	V	A	P	F	J	T	R	X	U	E	L
L	G	E	A	V	L	B	I	B	N	O	U	T	V	H	I	Z	I	Q	A
R	Y	S	R	N	U	R	E	T	C	C	F	K	I	W	N	F	X	J	Z

Chapters 1–8 Review

1. a) $-7x^2 + 2x + 3$; 3, 2, trinomial

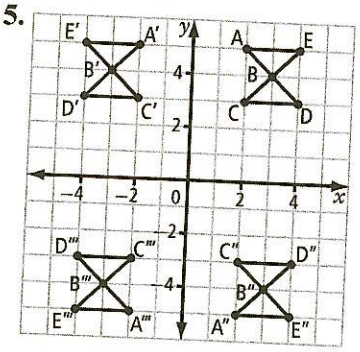
b) $2p + 15$; 2, 1, binomial

2. a) \$380 **b)** $3\frac{3}{5}$ h or 3.6 h

3. a) 2 **b)** 4 **c)** 2 **d)** $\frac{1}{4}$ **e)** $\frac{1}{2}$

4. $6x - 2$

5.



A′(−2, 5), B′(−3, 4), C′(−2, 3), D′(−4, 3) E′(−4, 5)

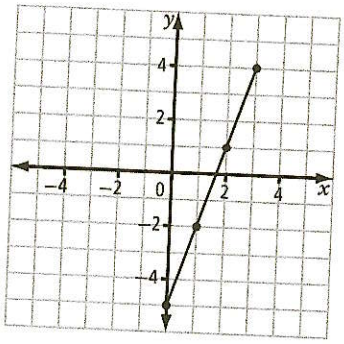
A″(2, −5), B″(3, −4), C″(2, −3), D″(4, −3), E″(4, −5)

A‴(−2, −5), B‴(−3, −4), C‴(−2, −3), D‴(−4, −3), E‴(−4, −5)

6. Example: 10 tricycles, 1 children's bike, and 1 mountain bike; or 5 tricycles, 2 children's bikes, and 2 mountain bikes

7.

x	y
0	−5
1	−2
2	1
3	4



8. a) $c = \frac{35}{9}$ or $3\frac{8}{9}$ **b)** $g = 2$ **c)** $f = -1$ **d)** $r = \frac{7}{3}$ or $2\frac{1}{3}$ **e)** $b = -34$

9. $(-5)^5 = -3125$

10. a) the number of times the coin is flipped

b) the number of possible outcomes

c) HHH, HHT, HTH, TTT, THH, TTH, THT

d) $2^{10} = 1024$

9 Get Ready

1. a) $5 > 2$ **b)** $7 < 20$ **c)** 5×3 **d)** $9 = \frac{18}{2}$

2. a) 4 is less than 8.

b) 8 is greater than 2.

c) 14 divided by 2.

d) 4 does not equal $\frac{8}{3}$.

12. Examples:

a) Let n equal the number of uses; $37.5n > 285$.

b) $n > 7.6$. Eight or more uses make the members' plan cheaper.

c) No. The boundary point of 7.6 is not a reasonable solution because only whole numbers are possible for the number of uses.

13. a) $3.49x > 49.95$

b) It becomes cheaper to buy the game when the number of days is greater than 14.

c) She should buy the game.

9.3 Solving Multi-Step Inequalities

1. isolate; equation; reverse; multiplying; dividing; negative
2. multi-step; left; right
3. comparing; inequalities
4. a) $x < 9$ b) $x \geq -18$
   c) $x < -\frac{12}{5}$ or $x < -2.4$
   d) $-\frac{3}{2} \leq x$ or $x \geq -\frac{3}{2}$ or $-1.5 \leq x$ or $x \geq -1.5$
5. a) $x \leq -12$ b) $x > -2$
   c) $x \leq -\frac{5}{2}$ or $x \leq -2.5$ d) $1 < x$ or $x > 1$
6. a) The solution is correct.

   b) The solution is not correct. $x > 1.5$.

   c) The solution is not correct. $3\frac{2}{5}$ is the boundary point, not part of the solution.

   d) The solution is correct.
7. a) Example: Let d = number of downloads per month.

   b) $29 + 0.8d < 17 + 1.19d$

   c) $d > 30.769\ldots$. Site A is a better deal when Ethan makes more than 30 downloads.
8. a) Example: Let t = time in hours a bike is rented.

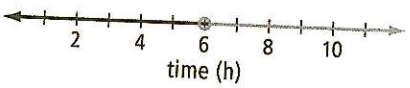
   b) $25 + 8t > 55$

   c) $t > 3.75$. The all-day plan is better if renting for at least 4 h.
9. a) Sheila will be closer after 2.6 h (2 h 36 min).

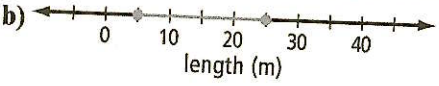
   b) Sheila would have to travel at least 89.6 km/h.

9 Chapter Link

1. Let t = time (h); $t > 6$



2. Examples: a) Let L = length painted on Michele's side; $L \geq 5$ and $L \leq 25$



3. a) Let t = time in hours; $3.5t \geq 5$

   b) Example: Hani can take a break after a little more than 1.4 h.
4. a) $3.5t > 3t + 5$. Hani will have painted farther after more than 10 h.

   b) Example: $3.5(11) > 3(11) + 5$, $38.5 > 38$. True

9 Vocabulary Link

1. inequality
2. open circle
3. combination of inequalities
4. closed circle
5. graphically
6. verbally
7. algebraically
8. solution of an inequality
9. boundary point

Chapters 1–9 Review

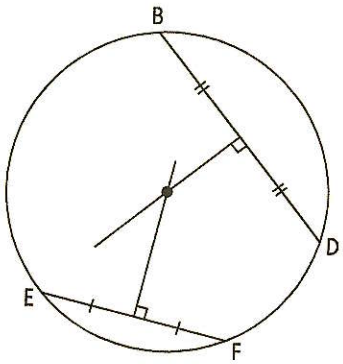
1. Example: $5x^2 - 4xy + 6$
2. a) Example: $y = -1.75$ b) Example: $x = 3$
   c) $y = \frac{3}{2}x - 4$ or $y = 1.5x - 4$
3. a) $8x - 14$ b) $4a^2 + 3a - 1$
   c) $10t^2 - 12t + 4$ d) $-2.3x + 0.2$
4. a) $\frac{1}{48}$ b) 604.8 cm
5. a) -2 b) $-14mn + 42n^2$ c) $9p - 1 + 3q$
   d) $\frac{2}{5}s^2 - \frac{4}{15}s$
6. 3.9 cm

7. a) 106°. Example: △STR is an isosceles triangle because ST and TR are both radii of the circle and therefore equal. 180 − 37 − 37 = 106

b) 53°. Example: Since they are subtended by the same arc, inscribed angle ∠RQS must be half the measure of the central angle ∠RTS.

10.2 Exploring Chord Properties

1. a)–c)



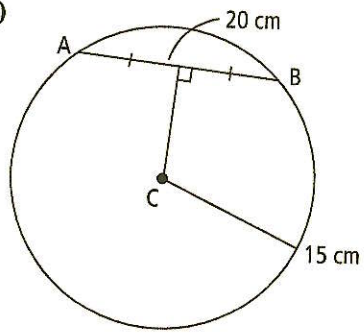
2. a) centre, bisectors, chords

b) bisector, chord, centre

c) centre, bisector, chord

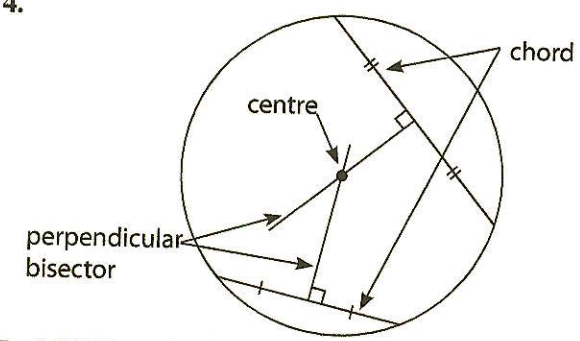
d) centre, chord, bisector

3. a)



b) 11.2 cm

4.



5. a) 14.28 cm **b)** 5.72 cm **c)** approximately 3.5 cm

6. 15.28 cm

7. a) Example: Use the rope to create two chords and their perpendicular bisectors; the centre of the circle is where the bisectors meet.

b) approximately 5.3 m

10.3 Tangents to a Circle

1. False. A tangent always touches a circle once.

2. False. The place a tangent touches a circle is called the point of tangency.

3. True **4.** True

5. a) 90°. Example: Segment FD is tangent to the circle at point F. FG is a radius. Tangents are perpendicular to the related radius.

b) 30°. Example: △FDG is a right triangle. The sum of angles in a triangle is 180°. 180° − 90° − 60° = 30°

c) 75°. Example: △FGH is an isosceles triangle and ∠FGH = 30°, and (180° − 30°) ÷ 2 = 75°

6. 73 cm **7. a)** 10.8 cm **b)** 39.5°

8. a) 12.03 m

b) Example: Darcy's arm forms the radius of his turning circle. This is half the diameter. When he lets the discus go, it leaves along a tangent to the circle he made.

9. 37.5°

10 Chapter Link

1. a) 90° **b)** central **2. a)** 45°

3. Yes. Example: One side of the △HED is the circle's diameter (chord HD).

4. 14.14 m

5. a) 2.93 m **b)** 18.47 m **c)** 7.66 m

6. 22.5°. Example: Since angle ∠BJD measures 90° or twice that of ∠BGD (being the inscribed angle subtended by the same arc), and radius JC bisects the chord resulting in ∠DJC measuring half of ∠BJD or 45°; ∠JCD = 180 − ∠DJC ÷ 2, or 67.5°; ∠JCL = 90° because CL is a tangent and GC is the diameter, so ∠DCL = 90 − ∠JCL or 22.5°.

11.1 Factors Affecting Data Collection

1. survey
2. influencing factors
3. bias
4. ethics
5. Examples:
   a) An influencing factor is the choice of people interviewed. Students should also be surveyed; not including them shows bias. When will the cafeteria customers be surveyed? Surveying them after a good meal may affect their response.
   b) There are no influencing factors. Customers at a sporting goods store may have opinions about the brand of snowboard they prefer.
   c) An influencing factor is cost. Offering a digital audio player might be quite costly for the administration.
   d) An influencing factor is ethics. Asking participants about something that they know is not allowed is unethical.
6. Examples:
   a) Bias: Yes. The bias is using language such as "fastest and smoothest" to describe one brand of snowboard. Rewrite: "What brand of snowboard would you buy?" or "What properties of a snowboard do you consider most important?"
   b) Bias: Yes. The bias is assuming that all people drink the three given beverages. Rewrite: "Which drink do you prefer? A Pop, B Coffee/tea, C Root beer, D Other _____ (Please specify.)"
7. Examples:
   a) Influencing factor: The government member may be biased in favour of the current premier. Rewrite: "Who do you think is the best premier in Canadian history?"
   b) Influencing factor: The respondents may be confused by the wording of the question. Rewrite: "What games and systems do you and your friends need?"
8. Examples:
   a) Question 1: "What is your favourite car colour?" Question 2: "What is the most popular car colour on drawings in a grade 9 art class?"
   b) Question 1: "Do you think it is important for family vehicles to have regular oil changes?" Question 2: "How often should family vehicles have an oil change? A Never, B Regularly, C Frequently, D Other _____ (Please specify.)"
9. Examples:
   a) Question: "What music group do you like best?" Whom to ask: Teens aged 13 to 19.
   b) Question: "What is the most important consideration when buying a digital music player?" Whom to ask: Customers shopping for a digital music player.
10. Example: "What is your favourite sport? A Hockey, B Soccer, C Volleyball, D Other _____ (Please specify.)"

11.2 Collecting Data

1. Example:
   - Population: All of the individuals being studied; all of the dogs in an animal shelter
   - Sample: Any group of individuals in a population; all of the mixed-breed dogs in an animal shelter
2. e) voluntary response sample
3. c) stratified sample
4. d) systematic sample
5. a) convenience sample
6. b) random sample
7. a) Population: All students at the school
   Examples:
   - Survey the population: If this is an election, everyone should be invited to vote.
   - Survey a sample: If this is an opinion poll, use a sample to determine the popular candidates.

   b) Population: All players on the lacrosse team.
   Example: Survey the population: Since the team is small in number, survey all team players.

b) experimental probability: 40%; theoretical probability: $33\frac{1}{3}$ %
Sample Assumptions:
- Each candidate has the same chance of winning.
- The sample represents the population of students who will vote in the election.

c) No. If the poll represents the population of voters, then candidate A will win, not candidate C.

8. a) 72.9 **b)** 70 **c)** 75.67

d) Example: Neither of the samples is a close predictor of the overall score. The mean of the first three games is significantly lower than the mean for the overall score. The mean of the last three games is significantly higher than the mean for the overall score.

9. The experimental probability of having blue eyes is 14.75%. This is slightly less than the article's claim for 16.67%, but more than Karen's prediction of 10%. The experimental results are closer to the article's claim.

11.4 Developing and Implementing a Project Plan

The purpose of this section is to assist you in developing and implementing a project plan. Responses will vary according to the research you plan.

11 Chapter Link

1. a) 250 **b)** 95%

c) The theoretical probability is 25%. This assumes that each category of browser has the same chance of being chosen.

d) The theoretical probability of 25% is less than the experimental probability of 27%.

e) Example: Yes. Since a stratified sample of 5000 Canadians was used, the sample appears to represent the population of grade 9 students. Therefore, the result indicating that Internet Explorer is the preferred choice can be generalized to the population.

2. Examples:

a) All grade 9 students in Canada who use the Internet

b) Use a sample. It would be impractical, costly, and time consuming to survey the population.

c) • Use a random sample by putting all the names of grade 9 students in the school in a box and drawing 50 names.
- Use a systematic sample by selecting every fifth student from a student roster.

d) What is your preferred online activity?
A E-mail/instant messaging, B Browsing, C Downloading and saving music, D Playing games, E Downloading or watching movies/TV, F Other _____ (Please specify.)

11 Vocabulary Link

1. influencing factors
2. stratified sample
3. convenience sample
4. random sample
5. population
6. survey
7. biased sample
8. systematic sample
9. voluntary response sample
10. sample
11. generalize