Math 9 Exam Review

Short Answer

1. This pattern of unit squares continues.
   Determine an equation that relates the number of unit squares, n, to the figure number, f.
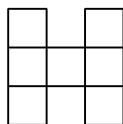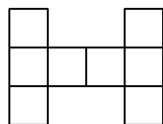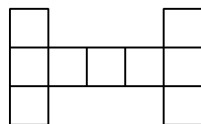
   Figure 1   Figure 2   Figure 3

2. The pattern in this table continues. Write an equation that relates the term value to the term number.

Term Number, t	1	2	3	4	5
Term Value, w	5	8	11	14	17

3. Shirley has $540 in her bank account. She withdraws $35 each week to cover her expenses.
   a) Write an equation that relates the amount of money in her account, A dollars, after n weeks.
   b) Determine the amount of money in Shirley's account after 8 weeks.

4. Here is a pattern made with toothpicks.
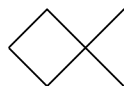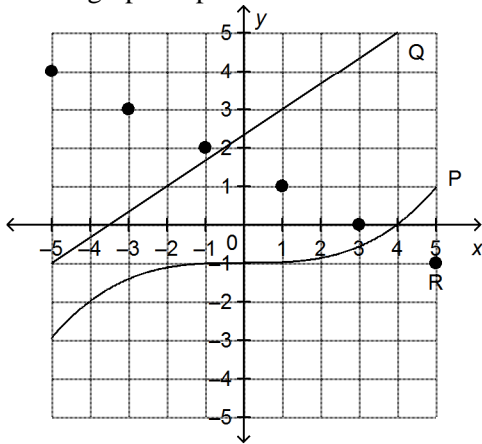   The pattern continues.

   Figure 1   Figure 2   Figure 3

   a) Write an equation that relates the number of toothpicks, N, to the figure number, n.
   b) How many toothpicks are needed for figure 80?

5. Which graphs represent a linear relation?

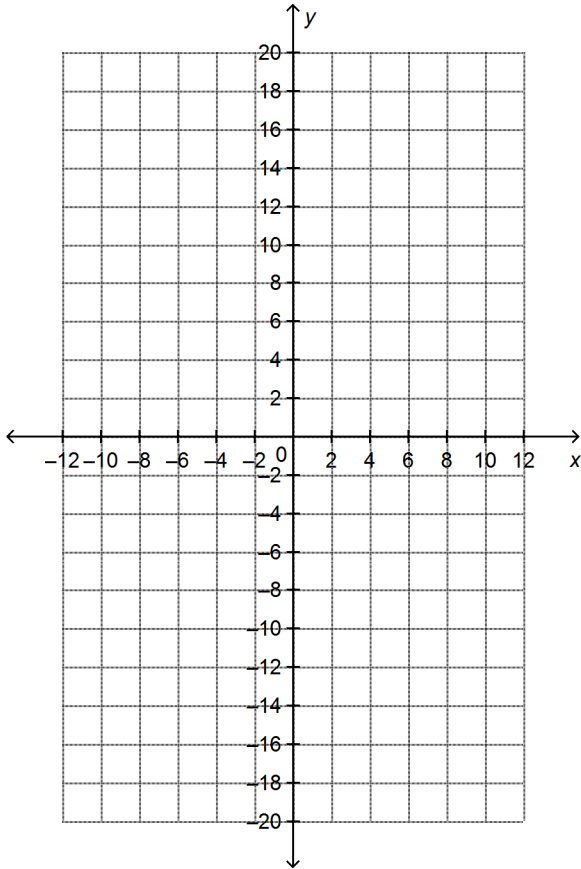6. a) Create a table of values for the linear relation $y = \frac{1}{2}x - 1$. Use ó4, ó2, 0, 2, 4 for values of x.

x	ó4	ó2	0	2	4
y					

.

7. Create a table of values for the linear relation $y = 4 - 4x$, then graph the relation.
   Use values of x from 0 to 6.

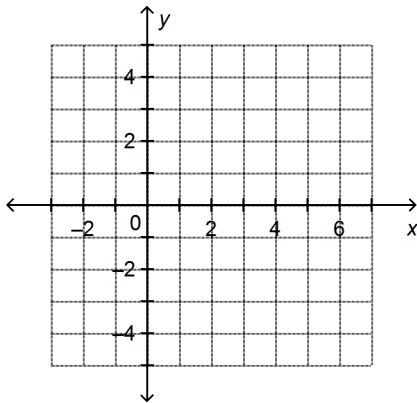| x	0	1	2	3	4	5	6
y							

8. Dorina is having a party. She estimates that she will need 5 sandwiches for each guest, and 12 extra sandwiches for unexpected guests.
   a) Write an equation that relates the total number of sandwiches, T, to the number of guests, p.
   b) How many sandwiches will Dorina need for 16 guests?

9. Graph the following lines on the same grid. Label the lines.
   i) $y = 2$
   ii) $x = 4$

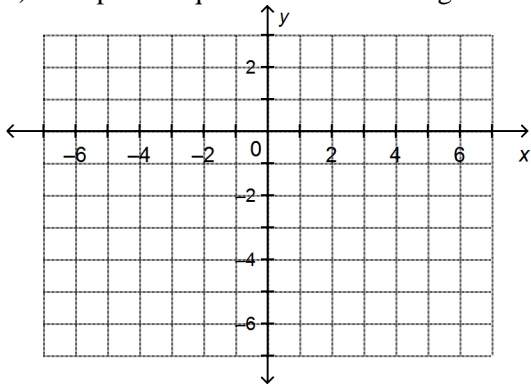10. a) For each equation, make a table of values for the given values of x.
   i) $x + 2y = -4$; for $x = -6$, 0, and 4

x	-6	0	4
y			

   ii) $x - 3y = 2$; for $x = -4$, -1, and 5

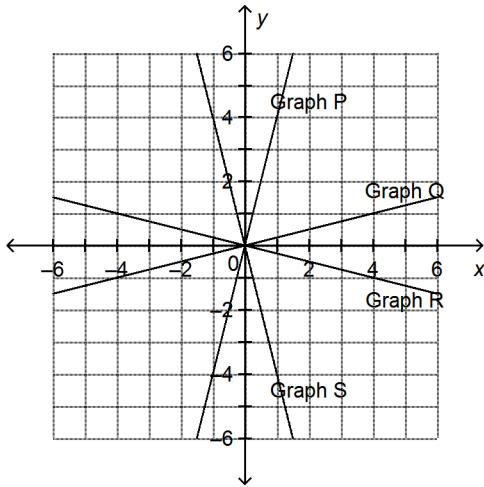 | x | -4 | -1 | 5 |
   |---|---|---|---|
   | y | | | |

   b) Graph the equations on the same grid.
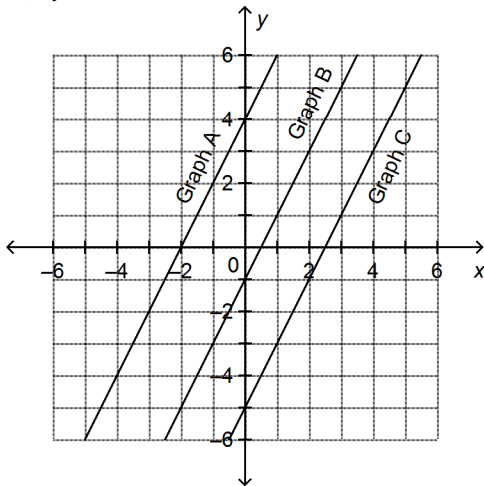
11. Match each equation with a graph on the grid below.
    i) $y = -0.25x$
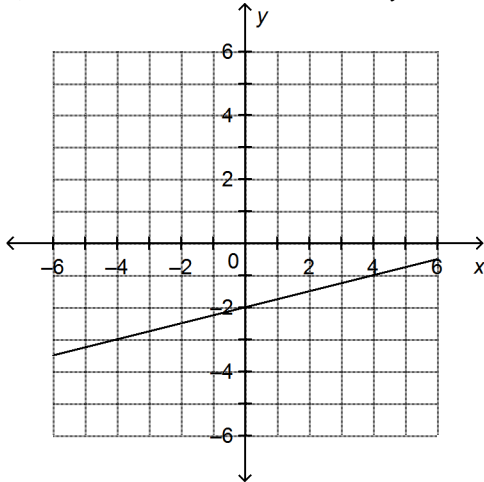   ii) $y = 4x$
    iii) $y = -4x$
    iv) $y = 0.25x$
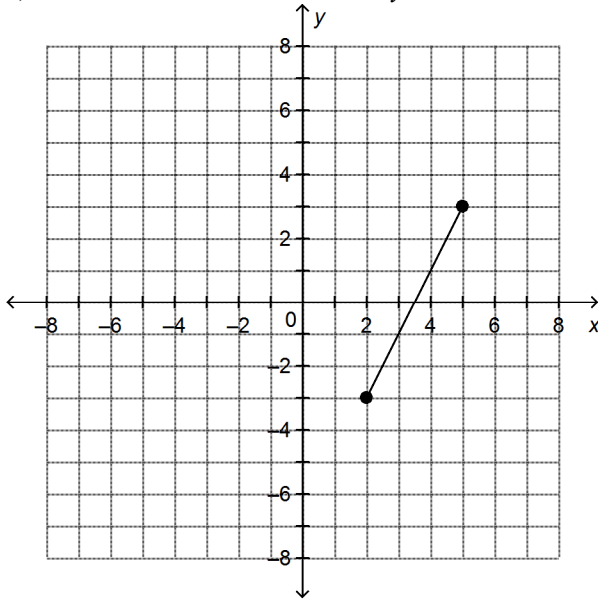

12. Match each equation with a graph on the grid below.
    i) $y = 2x - 1$
    ii) $y = 2x + 4$
    iii) $y = 2x - 5$

13. This graph represents a linear relation.
    a) Estimate the value of y when $x = \acute{o}3$.
    b) Estimate the value of x when $y = \acute{o}1.5$.

14. This graph represents a linear relation.
    a) Estimate the value of y when $x = 7$.
    b) Estimate the value of x when $y = \acute{o}5$.

15. Solve: $\dfrac{12}{-c} = -4,\ c \neq 0$

16. Solve: $2.4(v - 1.4) = 3.6(-v + 2.8)$

17. Solve: $\dfrac{x}{5} + \dfrac{7}{6} = \dfrac{6}{5}$

18. Solve: $\frac{3}{4}(3x-5) = \frac{1}{2}(2x+4)$
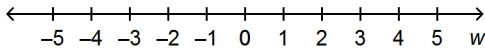
19. Car Rental Company A charges $29 a week, plus $13 per kilometre driven.
    Car Rental Company B charges $85 a week, plus $6 per kilometre driven.

    Determine the distance you must drive for the two rental costs to be the same.
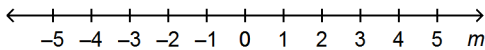   Model the problem with an equation.

20. Write an inequality whose solution is graphed on the number line.
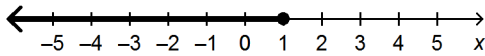
21. Graph the solution of $w > -2.5$ on a number line.

22. Graph the solution of $m \leq 3\frac{1}{2}$ on a number line.

23. Which operation will you perform on each side of the inequality to isolate the variable?
    $7 > 5 + x$

24. Which operation will you perform on each side of the inequality to isolate the variable?
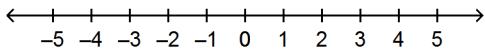 $-14 + z > 19$

25. Solve: $8w - 4 \geq 7w - 2$

26. Solve: $8 + 4f > 5f + 3$

27. Solve, then graph this inequality: $\frac{x}{3} + \frac{5}{6} \geq \frac{x}{2} + \frac{1}{3}$
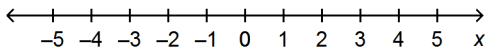

28. Solve $5 + \frac{2}{3}w > 4$. Graph the solution.

29. Solve: $8 - 3x < x + 2$

30. Solve: $2.4 + 3.7x < 4.2 + 2.5x$

31. A games room charges a $13 entrance fee, plus $2.35 per hour of play time. Anne-Marie has $29.45.
    For how long can she play in the games room?
    a) Choose a variable and write an inequality for this problem.
    b) Solve the inequality.

32. A square has side length 4.3 cm.
    The square is enlarged by a scale factor of 3.4.
    Determine the side length of the enlargement.

33. Determine the scale factor for this scale diagram.
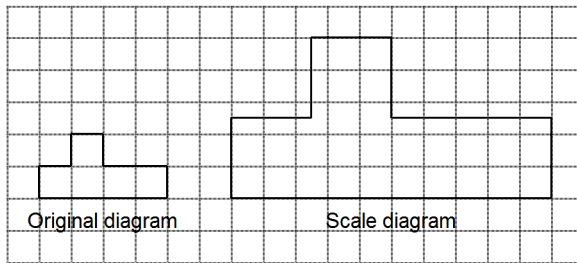
34. A hockey rink measures 52 m by 23 m. A scale diagram is drawn using a scale factor of $\dfrac{1}{200}$.

    Determine the dimensions of the rink in the scale diagram to the nearest centimetre.

35. An airplane is 58 m long. A scale model of the plane is 40.6 cm long.
    Determine the scale factor used to create the model as a decimal.

36. These polygons are similar. Determine the values of $x°$ and $y°$.
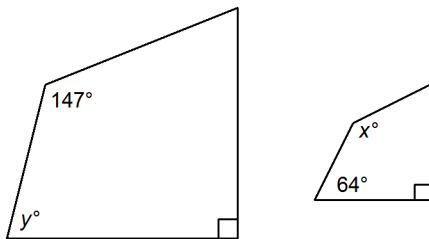
37. These quadrilaterals are similar. Determine the values of x and $y°$.
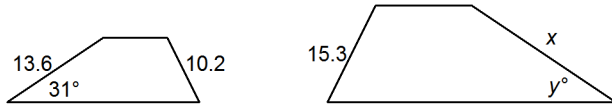
38. Triangle ABC is similar to $\triangle$PQR.

The ratios of the corresponding sides are: $\dfrac{AB}{PQ} = \dfrac{BC}{QR} = \dfrac{AC}{PR}$

State the corresponding angles.

39. Triangle KLM is similar to $\triangle$RST.
The corresponding angles are: $\angle K = \angle R,\ \angle L = \angle S,\ \angle M = \angle T$
State the ratios of the corresponding sides.

40. Determine the length of EF in these similar triangles.
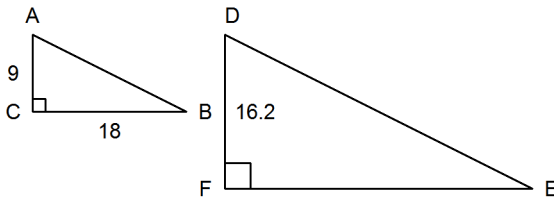
41. Determine the length of BD in these similar triangles.
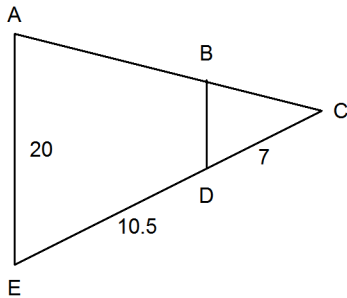
42. Determine the length of RS in these similar triangles.
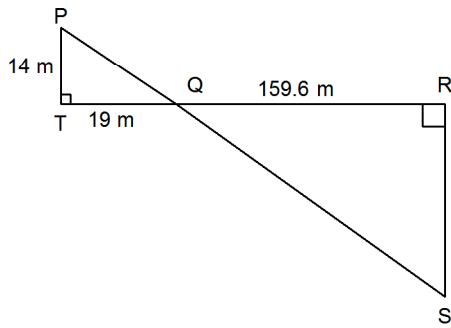
43. This scale diagram shows the measurements a surveyor made to determine the height of a building. What is this height?
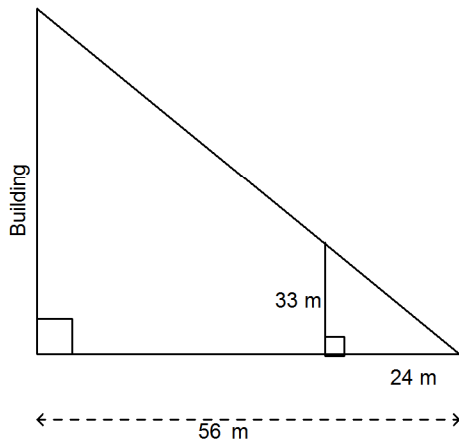
44. State the number of lines of symmetry in each design.

a)

b)
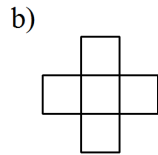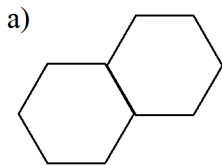
45. This polygon is one-half of a shape. Use the dotted line as a line of symmetry to complete the shape by drawing its other half.
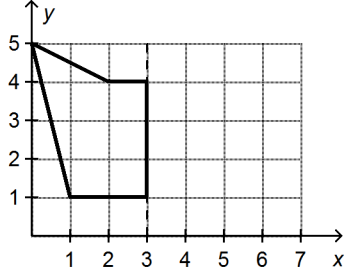
46. Polygon PQRST is part of a larger shape.
    a) Draw the image of polygon PQRST after a reflection in the *x*-axis.
    b) How many lines of symmetry does the larger shape have?
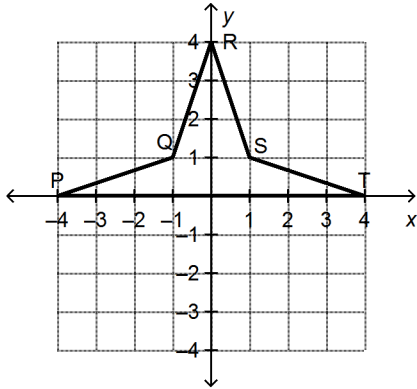
47. Draw the rotation image after rotating the shape 90° clockwise about P.
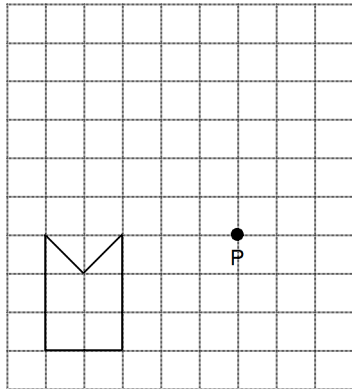
48. O is the centre of this circle and point Q is a point of tangency.
    Determine the values of *s* and *t*. If necessary, give your answers to the nearest tenth.
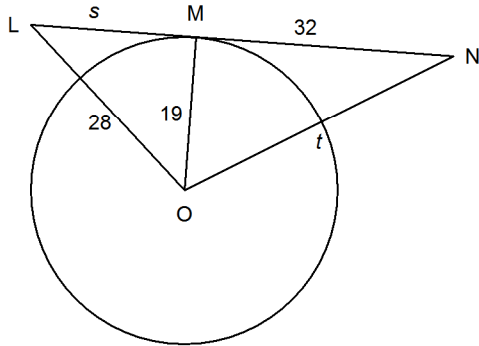
49. O is the centre of this circle and point S is a point of tangency.
    Determine the values of *m* and *n*°. If necessary, give your answers to the nearest tenth.
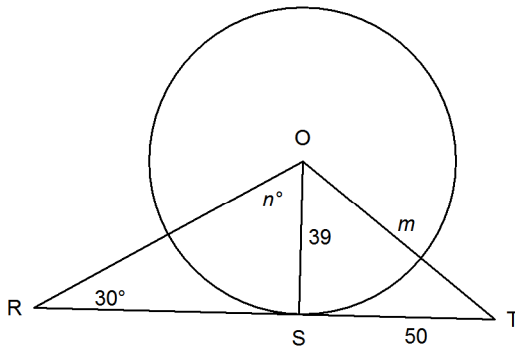
50. Point O is the centre of this circle.
     Determine the values of $x°$ and $y°$.
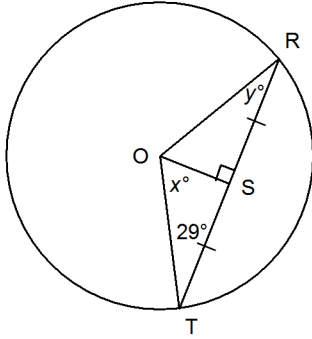
51. Point O is the centre of this circle. Without solving for a, sketch and label the length of any extra line segments you need to draw to determine the value of a.
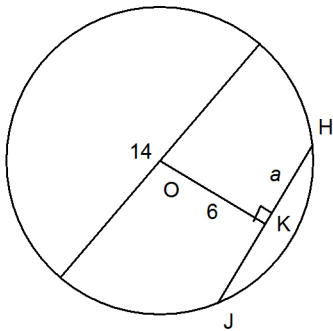
52. Point O is the centre of this circle.
     Determine the value of m to the nearest tenth, if necessary.
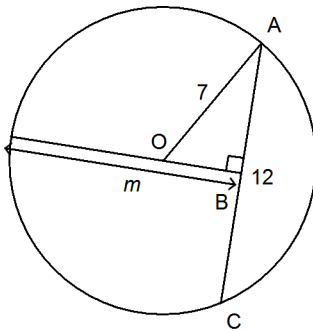
53. Point O is the centre of this circle.
    Determine the values of $y°$ and $z°$.
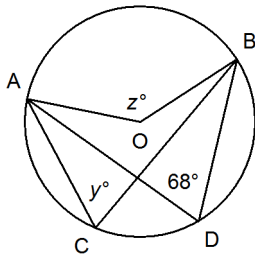
54. Point O is the centre of the circle.
    Determine the values of $a°$ and $c°$.
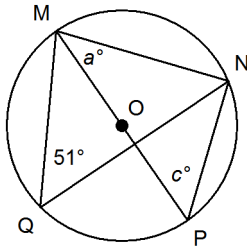
55. Point O is the centre of the circle.
    Determine the values of $y°$ and $z°$.
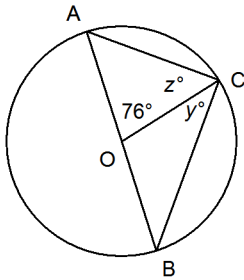
Problem

56. a) Graph the solutions to these two inequalities on the same number line.
$x < -1$ and $x \geq 7$
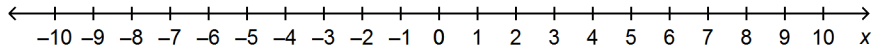
b) i) Write 3 points that are less than -1.
ii) Write 3 points that are greater than or equal to 7.

57. Match each inequality with the graph of its solution below. If an inequality does not have a match, draw the graph of its solution on a number line.
a) $p \leq 1$
b) $q > 2$
c) $r < -2$
d) $s \geq -1$
e) $t > 3$

i)
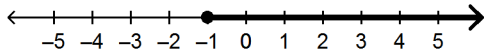
ii)
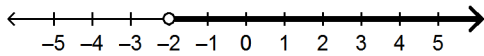
iii)
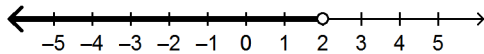
iv)
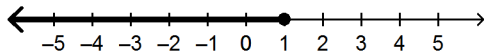
v)
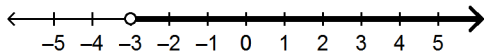
58. Match each inequality with the graph of its solution below.
    For the graph that does not have a match, write the inequality represented by the graph.
    a) $2t - 3 < t + 3$
    b) $3 + v > 2v + 4$
    c) $5x + 6 > 4x + 7$

    i)
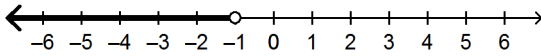
    ii)
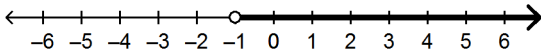
    iii)
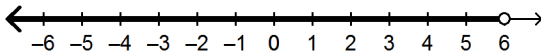
    iv)
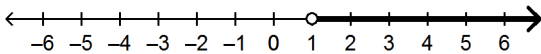
59. AQ is a tangent to the circle with centre B and to the circle with centre C.
    The points of tangency are P and Q.
    Determine the value of y to the nearest tenth.
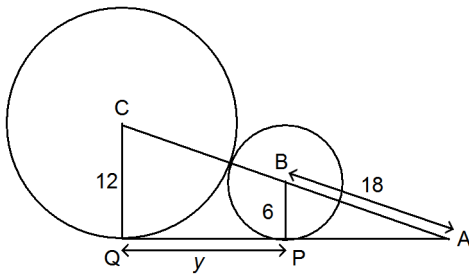
Math 9 Exam Review
Answer Section

SHORT ANSWER

1. ANS:
   $n = 6 + f$

   PTS: 1   DIF: Moderate   REF: 4.1 Writing Equations to Describe Patterns
   LOC: 9.PR1   TOP: Patterns and Relations (Patterns)   KEY: Conceptual Understanding

2. ANS:
   $w = 3t + 2$

   PTS: 1   DIF: Moderate   REF: 4.1 Writing Equations to Describe Patterns
   LOC: 9.PR1   TOP: Patterns and Relations (Patterns)   KEY: Conceptual Understanding

3. ANS:
   a) $A = 540 - 35n$
   b) $260

   PTS: 1   DIF: Moderate   REF: 4.1 Writing Equations to Describe Patterns
   LOC: 9.PR1   TOP: Patterns and Relations (Patterns)
   KEY: Conceptual Understanding | Procedural Knowledge

4. ANS:
   a) $N = 2n + 2$
   b) 162

   PTS: 1   DIF: Moderate   REF: 4.1 Writing Equations to Describe Patterns
   LOC: 9.PR1   TOP: Patterns and Relations (Patterns)
   KEY: Conceptual Understanding | Procedural Knowledge

5. ANS:
   Graphs Q and R.

   PTS: 1   DIF: Easy   REF: 4.2 Linear Relations
   LOC: 9.PR2   TOP: Patterns and Relations (Patterns)   KEY: Conceptual Understanding

6. ANS:
   a)

x	ó4	ó2	0	2	4
y	ó3	ó2	ó1	0	1

   PTS: 1   DIF: Moderate   REF: 4.2 Linear Relations
   LOC: 9.PR2   TOP: Patterns and Relations (Patterns)   KEY: Procedural Knowledge

7. ANS:

x	0	1	2	3	4	5	6
y	4	0	ó4	ó8	ó12	ó16	ó20
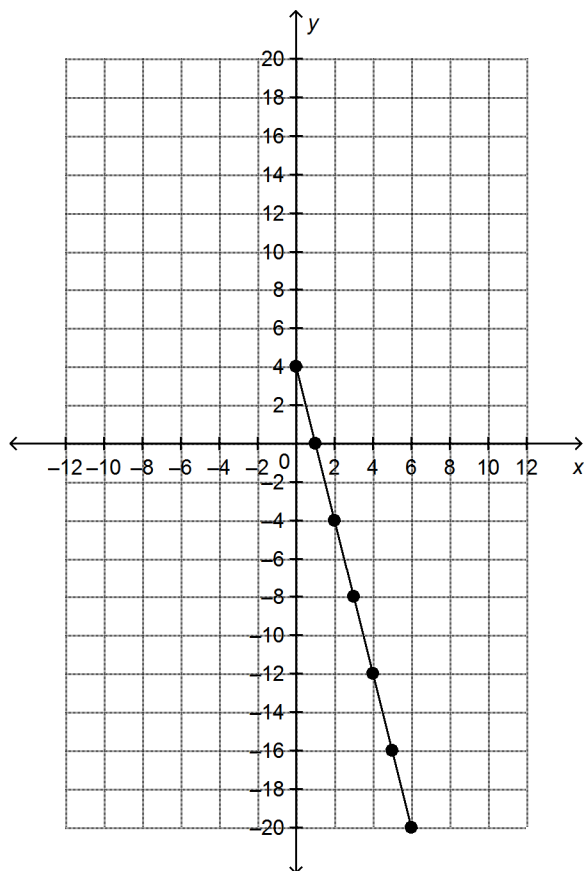
PTS: 1   DIF: Moderate   REF: 4.2 Linear Relations
LOC: 9.PR2   TOP: Patterns and Relations (Patterns)   KEY: Procedural Knowledge

8. ANS:
   a) $T = 5p + 12$
   b) 92 sandwiches

PTS: 1   DIF: Moderate   REF: 4.2 Linear Relations
LOC: 9.PR2   TOP: Patterns and Relations (Patterns)
KEY: Conceptual Understanding | Procedural Knowledge

9. ANS:
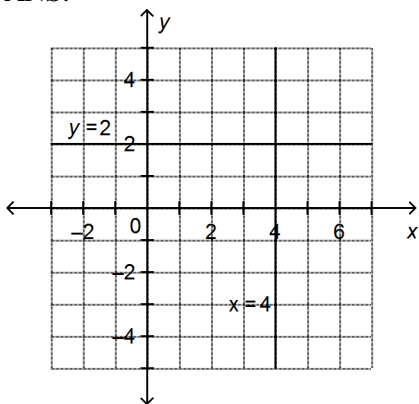
PTS: 1   DIF: Easy   REF: 4.3 Another Form of the Equation for a Linear Relation
LOC: 9.PR1   TOP: Patterns and Relations (Patterns)   KEY: Procedural Knowledge

10. ANS:
a)

x	–6	0	4
y	1	–2	–4

b)

x	–4	–1	5
y	–2	–1	1

c)
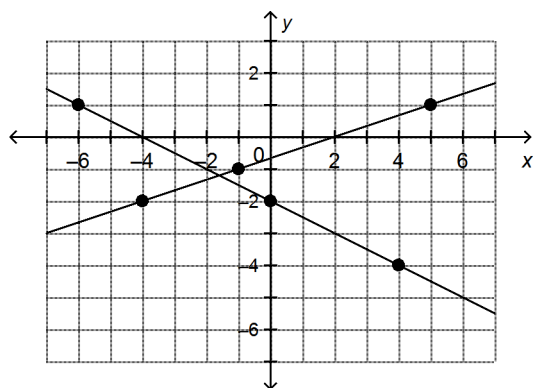
PTS: 1   DIF: Moderate   REF: 4.3 Another Form of the Equation for a Linear Relation
LOC: 9.PR1   TOP: Patterns and Relations (Patterns)   KEY: Procedural Knowledge

11. ANS:
Graph P: $y = 4x$
Graph Q: $y = 0.25x$
Graph R: $y = -0.25x$
Graph S: $y = -4x$

PTS: 1   DIF: Moderate   REF: 4.4 Matching Equations and Graphs
LOC: 9.PR2   TOP: Patterns and Relations (Patterns)   KEY: Procedural Knowledge

12. ANS:
Graph A: $y = 2x + 4$
Graph B: $y = 2x - 1$
Graph C: $y = 2x - 5$

PTS: 1   DIF: Moderate   REF: 4.4 Matching Equations and Graphs
LOC: 9.PR2   TOP: Patterns and Relations (Patterns)   KEY: Procedural Knowledge

13. ANS:
a) $y = 62.75$
b) $x = 2$

PTS: 1   DIF: Moderate   REF: 4.5 Using Graphs to Estimate Values
LOC: 9.PR2   TOP: Patterns and Relations (Patterns)   KEY: Procedural Knowledge

14. ANS:
a) $y = 7$
b) $x = 1$

PTS: 1   DIF: Moderate   REF: 4.5 Using Graphs to Estimate Values
LOC: 9.PR2   TOP: Patterns and Relations (Patterns)   KEY: Procedural Knowledge

15. ANS:
$c = 3$

PTS: 1   DIF: Easy   REF: 6.2 Solving Equations by Using Balance Strategies
LOC: 9.PR3   TOP: Patterns and Relations (Variables and Equations)
KEY: Procedural Knowledge

16. ANS:
$v = 2.24$

PTS: 1   DIF: Moderate   REF: 6.2 Solving Equations by Using Balance Strategies
LOC: 9.PR3   TOP: Patterns and Relations (Variables and Equations)
KEY: Procedural Knowledge

17. ANS:
$x = \dfrac{1}{6}$

PTS: 1   DIF: Difficult   REF: 6.2 Solving Equations by Using Balance Strategies
LOC: 9.PR3   TOP: Patterns and Relations (Variables and Equations)
KEY: Procedural Knowledge

18. ANS:

$x = 4\dfrac{3}{5}$

PTS: 1   DIF: Difficult   REF: 6.2 Solving Equations by Using Balance Strategies
LOC: 9.PR3   TOP: Patterns and Relations (Variables and Equations)
KEY: Procedural Knowledge

19. ANS:
Let d represent the distance driven.
$29 + 13d = 85 + 6d$

PTS: 1   DIF: Difficult   REF: 6.2 Solving Equations by Using Balance Strategies
LOC: 9.PR3   TOP: Patterns and Relations (Variables and Equations)
KEY: Procedural Knowledge

20. ANS:
$x \leq 1$

PTS: 1   DIF: Moderate   REF: 6.3 Introduction to Linear Inequalities
LOC: 9.PR4   TOP: Patterns and Relations (Variables and Equations)
KEY: Procedural Knowledge

21. ANS:
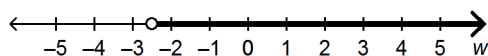
PTS: 1   DIF: Moderate   REF: 6.3 Introduction to Linear Inequalities
LOC: 9.PR4   TOP: Patterns and Relations (Variables and Equations)
KEY: Procedural Knowledge

22. ANS:
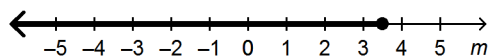
PTS: 1   DIF: Moderate   REF: 6.3 Introduction to Linear Inequalities
LOC: 9.PR4   TOP: Patterns and Relations (Variables and Equations)
KEY: Procedural Knowledge

23. ANS:
Subtract 5 from each side.

PTS: 1   DIF: Easy
REF: 6.4 Solving Linear Inequalities by Using Addition and Subtraction
LOC: 9.PR4   TOP: Patterns and Relations (Variables and Equations)
KEY: Procedural Knowledge

24. ANS:
    Add 14 to each side.

    PTS: 1   DIF: Easy
    REF: 6.4 Solving Linear Inequalities by Using Addition and Subtraction
    LOC: 9.PR4   TOP: Patterns and Relations (Variables and Equations)
    KEY: Procedural Knowledge

25. ANS:
    $w \geq 2$

    PTS: 1   DIF: Moderate
    REF: 6.4 Solving Linear Inequalities by Using Addition and Subtraction
    LOC: 9.PR4   TOP: Patterns and Relations (Variables and Equations)
    KEY: Procedural Knowledge

26. ANS:
    $f < 5$

    PTS: 1   DIF: Moderate
    REF: 6.4 Solving Linear Inequalities by Using Addition and Subtraction
    LOC: 9.PR4   TOP: Patterns and Relations (Variables and Equations)
    KEY: Procedural Knowledge

27. ANS:
    $x \leq 3$

    PTS: 1   DIF: Moderate
    REF: 6.4 Solving Linear Inequalities by Using Addition and Subtraction
    LOC: 9.PR4   TOP: Patterns and Relations (Variables and Equations)
    KEY: Procedural Knowledge

28. ANS:
    $w > -1.5$

    PTS: 1   DIF: Moderate
    REF: 6.5 Solving Linear Inequalities by Using Multiplication and Division
    LOC: 9.PR4   TOP: Patterns and Relations (Variables and Equations)
    KEY: Procedural Knowledge

29. ANS:
    $x > 1.5$

    PTS: 1   DIF: Moderate
    REF: 6.5 Solving Linear Inequalities by Using Multiplication and Division
    LOC: 9.PR4   TOP: Patterns and Relations (Variables and Equations)
    KEY: Procedural Knowledge

30. ANS:
    $x < 1.5$

    PTS: 1   DIF: Moderate
    REF: 6.5 Solving Linear Inequalities by Using Multiplication and Division
    LOC: 9.PR4   TOP: Patterns and Relations (Variables and Equations)
    KEY: Procedural Knowledge

31. ANS:
    a) Let h represent the number of hours of play time.
       $13 + 2.35h \le 29.45$
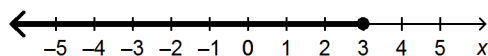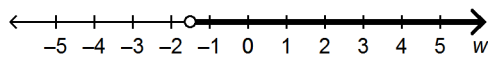   b) $h \le 7$

    PTS: 1   DIF: Moderate
    REF: 6.5 Solving Linear Inequalities by Using Multiplication and Division
    LOC: 9.PR4   TOP: Patterns and Relations (Variables and Equations)
    KEY: Procedural Knowledge

32. ANS:
    14.62 cm

    PTS: 1   DIF: Moderate   REF: 7.1 Scale Diagrams and Enlargements
    LOC: 9.SS4   TOP: Shape and Space (Transformations)
    KEY: Procedural Knowledge

33. ANS:
    The scale factor is 2.5.

    PTS: 1   DIF: Moderate   REF: 7.1 Scale Diagrams and Enlargements
    LOC: 9.SS4   TOP: Shape and Space (Transformations)
    KEY: Procedural Knowledge

34. ANS:
    26 cm by 12 cm

    PTS: 1   DIF: Moderate   REF: 7.2 Scale Diagrams and Reductions
    LOC: 9.SS4   TOP: Shape and Space (Transformations)
    KEY: Procedural Knowledge

35. ANS:
    0.007

    PTS: 1   DIF: Moderate   REF: 7.2 Scale Diagrams and Reductions
    LOC: 9.SS4   TOP: Shape and Space (Transformations)
    KEY: Procedural Knowledge

36. ANS:
    $x = 147°$
    $y = 64°$

    PTS: 1   DIF: Easy   REF: 7.3 Similar Polygons
    LOC: 9.SS3   TOP: Shape and Space (3-D Objects and 2-D Shapes)
    KEY: Conceptual Understanding

37. ANS:
$x = 20.4$
$y° = 31°$

PTS: 1   DIF: Moderate   REF: 7.3 Similar Polygons
LOC: 9.SS3   TOP: Shape and Space (3-D Objects and 2-D Shapes)
KEY: Conceptual Understanding | Procedural Knowledge

38. ANS:
$\angle A = \angle P, \ \angle B = \angle Q, \ \angle C = \angle R$

PTS: 1   DIF: Easy   REF: 7.4 Similar Triangles
LOC: 9.SS3   TOP: Shape and Space (3-D Objects and 2-D Shapes)
KEY: Conceptual Understanding

39. ANS:
$$\frac{KL}{RS} = \frac{LM}{ST} = \frac{KM}{RT}$$

PTS: 1   DIF: Easy   REF: 7.4 Similar Triangles
LOC: 9.SS3   TOP: Shape and Space (3-D Objects and 2-D Shapes)
KEY: Conceptual Understanding

40. ANS:
$EF = 32.4$

PTS: 1   DIF: Easy   REF: 7.4 Similar Triangles
LOC: 9.SS3   TOP: Shape and Space (3-D Objects and 2-D Shapes)
KEY: Procedural Knowledge

41. ANS:
$BD = 8$

PTS: 1   DIF: Moderate   REF: 7.4 Similar Triangles
LOC: 9.SS3   TOP: Shape and Space (3-D Objects and 2-D Shapes)
KEY: Procedural Knowledge

42. ANS:
$RS = 117.6$ m

PTS: 1   DIF: Moderate   REF: 7.4 Similar Triangles
LOC: 9.SS3   TOP: Shape and Space (3-D Objects and 2-D Shapes)
KEY: Procedural Knowledge

43. ANS:
77 m

PTS: 1   DIF: Moderate   REF: 7.4 Similar Triangles
LOC: 9.SS3   TOP: Shape and Space (3-D Objects and 2-D Shapes)
KEY: Procedural Knowledge

44. ANS:
    a) 2
    b) 4

    PTS: 1   DIF: Easy   REF: 7.5 Reflections and Line Symmetry
    LOC: 9.SS5   TOP: Shape and Space (Transformations)
    KEY: Conceptual Understanding

45. ANS:

    PTS: 1   DIF: Easy   REF: 7.5 Reflections and Line Symmetry
    LOC: 9.SS5   TOP: Shape and Space (Transformations)
    KEY: Procedural Knowledge

46. ANS:
    a)

    b) 4

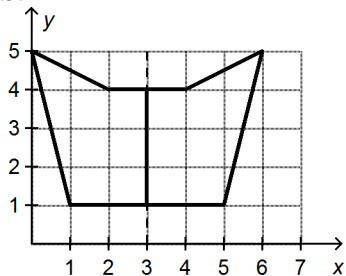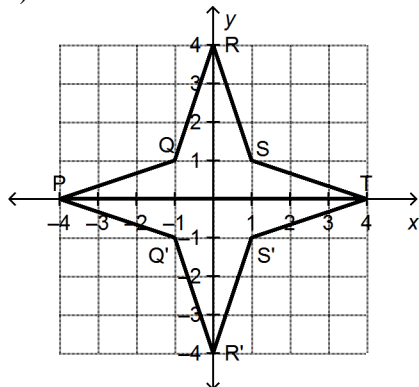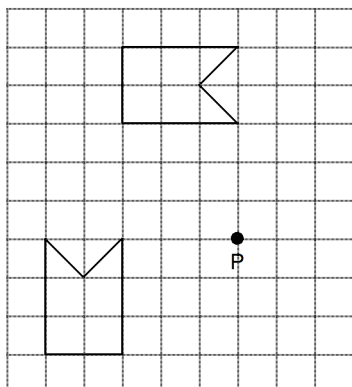   PTS: 1   DIF: Moderate   REF: 7.5 Reflections and Line Symmetry
    LOC: 9.SS5   TOP: Shape and Space (Transformations)
    KEY: Procedural Knowledge

47. ANS:

PTS: 1   DIF: Easy   REF: 7.6 Rotations and Rotational Symmetry
LOC: 9.SS5   TOP: Shape and Space (Transformations)
KEY: Procedural Knowledge

48. ANS:
$s = 20.6$, $t = 37.2$

PTS: 1   DIF: Moderate   REF: 8.1 Properties of Tangents to a Circle
LOC: 9.SS1   TOP: Shape and Space (Measurement)   KEY: Conceptual Understanding

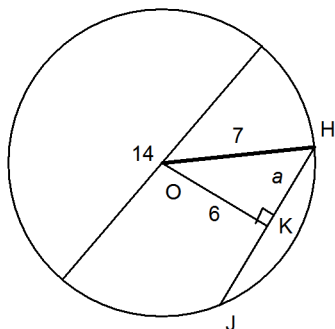49. ANS:
$m = 63.4$, $n° = 60°$

PTS: 1   DIF: Moderate   REF: 8.1 Properties of Tangents to a Circle
LOC: 9.SS1   TOP: Shape and Space (Measurement)   KEY: Conceptual Understanding

50. ANS:
$x° = 61°$, $y° = 29°$

PTS: 1   DIF: Easy   REF: 8.2 Properties of Chords in a Circle
LOC: 9.SS1   TOP: Shape and Space (Measurement)   KEY: Conceptual Understanding

51. ANS:
Answers may vary. For example:

    PTS: 1   DIF: Easy   REF: 8.2 Properties of Chords in a Circle
    LOC: 9.SS1   TOP: Shape and Space (Measurement)   KEY: Conceptual Understanding

52. ANS:
$m = 10.6$

    PTS: 1   DIF: Moderate   REF: 8.2 Properties of Chords in a Circle
    LOC: 9.SS1   TOP: Shape and Space (Measurement)   KEY: Conceptual Understanding

53. ANS:
$y° = 68°, z° = 136°$

    PTS: 1   DIF: Easy   REF: 8.3 Properties of Angles in a Circle
    LOC: 9.SS1   TOP: Shape and Space (Measurement)   KEY: Conceptual Understanding

54. ANS:
$a° = 39°, c° = 51°$

    PTS: 1   DIF: Moderate   REF: 8.3 Properties of Angles in a Circle
    LOC: 9.SS1   TOP: Shape and Space (Measurement)   KEY: Conceptual Understanding

55. ANS:
$y° = 38°, z° = 52°$

    PTS: 1   DIF: Moderate   REF: 8.3 Properties of Angles in a Circle
    LOC: 9.SS1   TOP: Shape and Space (Measurement)   KEY: Conceptual Understanding
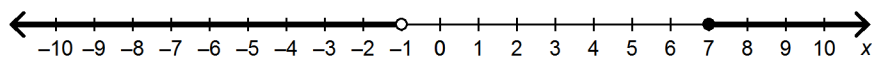
PROBLEM

56. ANS:
    a)

    b) i) Answers will vary.
           Any 3 points to the left of −1 on the number line, excluding −1.
           For example: ó3, ó7, ó10
       ii) Answers will vary.
           Any 3 points that are greater than or equal to 7. For example: 12, 15, 24

    PTS: 1   DIF: Difficult   REF: 6.3 Introduction to Linear Inequalities
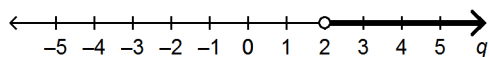   LOC: 9.PR4   TOP: Patterns and Relations (Variables and Equations)
    KEY: Problem-Solving Skills | Communication
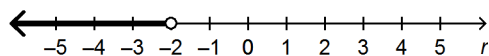
57. ANS:
    a) Graph iv
    b)

    c)

    d) Graph i
    e) Graph v

    PTS: 1   DIF: Difficult   REF: 6.3 Introduction to Linear Inequalities
    LOC: 9.PR4   TOP: Patterns and Relations (Variables and Equations)
    KEY: Problem-Solving Skills

58. ANS:
    a) Graph iii
    b) Graph i
    c) Graph iv
    The inequality represented by Graph ii is $x > -1$.

    PTS: 1   DIF: Difficult
    REF: 6.4 Solving Linear Inequalities by Using Addition and Subtraction
    LOC: 9.PR4   TOP: Patterns and Relations (Variables and Equations)
    KEY: Problem-Solving Skills

59. ANS:
Use the Pythagorean Theorem in $\triangle ABP$ to solve for AP.

$AP^2 = 18^2 - 6^2$

$AP = \sqrt{18^2 - 6^2}$

$AP \doteq 16.9706\ldots$

$\triangle ABP \cong \triangle ACQ$
Consider $\triangle ACQ$ as an enlargement of $\triangle ABP$.
The scale ratio is:

$\dfrac{CQ}{BP} = \dfrac{12}{6}$

$\quad = 2$

So, AQ = 2(AP)
Then,

$y = AQ - AP$

$\quad = 2(AP) - AP$

$\quad = AP$

So, $y \doteq 17.0$

PTS: 1   DIF: Difficult   REF: 8.1 Properties of Tangents to a Circle
LOC: 9.SS1   TOP: Shape and Space (Measurement)   KEY: Problem-Solving Skills