Algebra Skills Review

Perform the indicated operation.

1. $\dfrac{\frac{1}{5}}{\frac{12}{7}}$

2. $\dfrac{\frac{7}{9}}{\frac{12}{4}}$

3. $\dfrac{2}{21} - \dfrac{1}{2}$

4. $\dfrac{1}{2} + \dfrac{3}{8}$

Solve for x and y.

5. $\begin{cases} 2x + y = 5 \\ -6x - 3y = -15 \end{cases}$

6. $\begin{cases} 7x + 4y = -5 \\ -2x + 5y = 26 \end{cases}$

Factor each polynomial completely.

7. $3b^2 - 6b$

8. $2b^2 + 18b + 16$

9. $2x^2 + 9x + 4$

10. $5x^2 - 11x - 12$

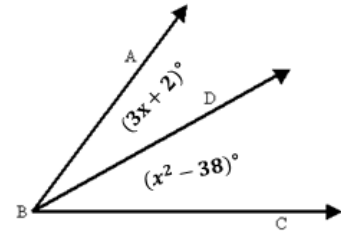Simplify each radical completely.

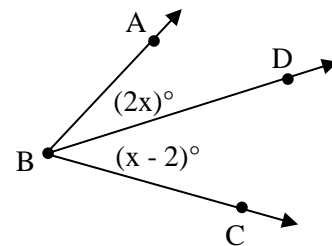11. $\sqrt{192}$

12. $\sqrt{48}$

13. $\sqrt{180}$

14. $\overline{CD}$ has endpoint C(5,3) and D(-8,9). To the nearest tenth, what is the distance, in units, from point C to the midpoint of the segment?

15. $\overline{ET}$ has endpoint E(5,7) and midpoint M (2, -6). Find the coordinates for endpoint T.

16. $\overline{BD}$ bisects $\angle ABC$. Find the value of x and m $\angle ABC$.

17. If the $m\angle ABC = 88°$ then, solve for x.

18. Point M is between L and N on $\overline{LN}$. Use the given information to write an equation in terms of x. Solve the equation. Then find LM and MN. LM = x^2, MN= x and LN = 12.
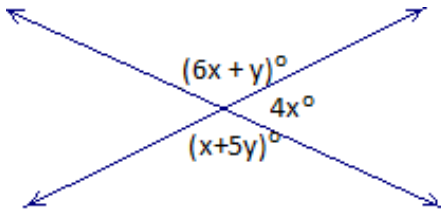
19. The measure of an angle is 28° less than the measure of its complement. Find the measure of the angle and the measure of its complement.

20. The measure of an angle is 12 less than 3 times the measure of its supplement. Find the measure of the angle and the measure of its supplement.
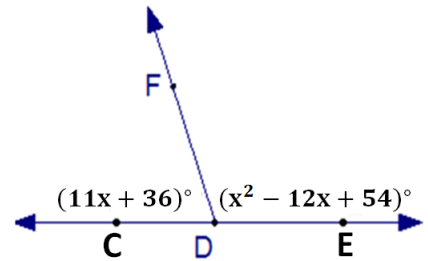
21. Solve for x and y.

$(3x + 18)°$

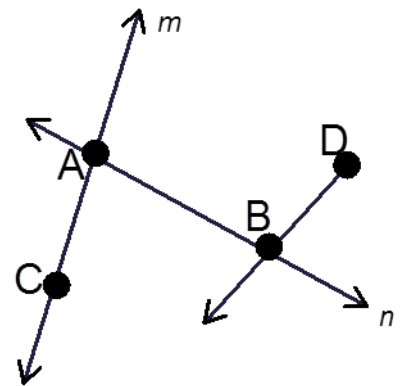$(5x + 2)°$ $2(y + 6)°$
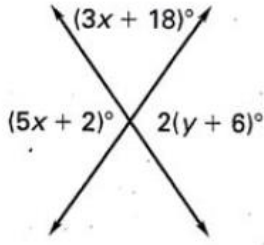
22. Solve for x and y.

$(6x + y)°$
$4x°$
$(x+5y)°$

23. Given that $\angle CDE$ is a straight angle, please solve for x and find $m\angle CDF$ and $m\angle FDE$.

F

$(11x + 36)°$ $(x^2 - 12x + 54)°$
C   D   E

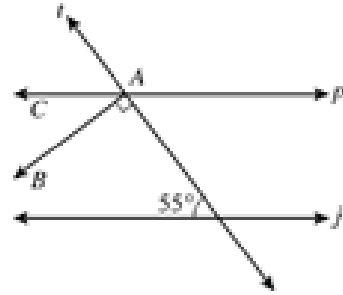24. Using the diagram on the right, please give two different examples, using correct notation, for each of the following:

m

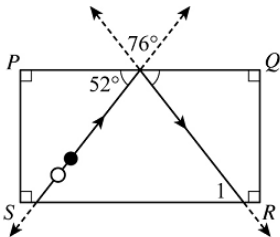| Figure	Example 1	Example 2
Segment		
Ray		
Line		

A

D

B

C

n

3

25. In this drawing, line p is parallel to line j and line t is perpendicular to $\overline{AB}$. What is the measure of $\angle BAC$?

26. Alejandra is playing pool. The path of the ball is shown in the diagram below.

What is the measure of $\angle 1$?

  Ⓕ 52°
  Ⓖ 76°
  Ⓗ 104°
  Ⓙ 128°

27. Do the equations of the following lines make them parallel, perpendicular, or neither?

a. l: $y = \dfrac{1}{3}x - 2$ h: $6y = 2x + 12$ b. q: $4x - 2y = 6$ w: $2x + 4y = 6$

28. Write an equation of a line which passes through P(-2, 5) and is perpendicular to the line $y = 3x - 7$.
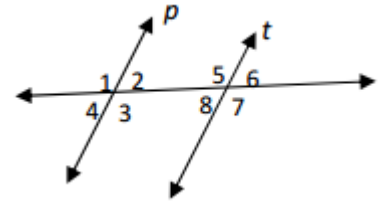
29. Given $l \parallel m$, find the values of x. Be sure to check for extraneous solutions. Diagram is not drawn to scale.
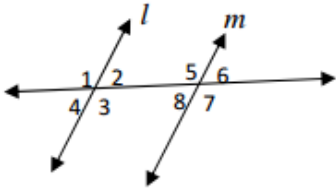
a) $m\angle 3 = (x^2 + 112)°$, $m\angle 8 = (16x + 131)°$

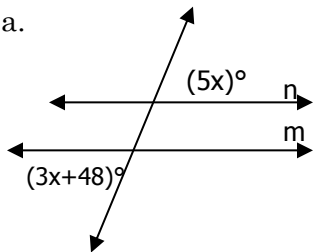b) $m\angle 1 = (x^2 - 7x)°$, $m\angle 7 = (-x + 7)°$

30. Given $p \parallel t$, $m\angle 1 = (12x - 4y)°$, $m\angle 8 = (x - 4y)°$, and $m\angle 5 = (15x + 8y)°$, find the values of x and y, and the measure of each angle.
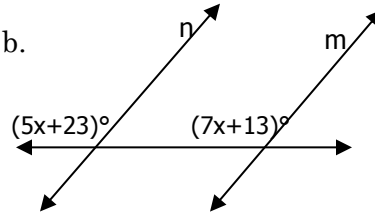
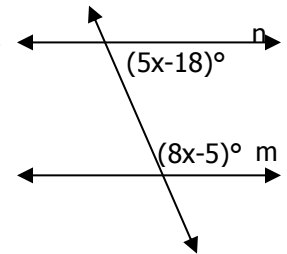31. Find the value of x so that n || m. State the theorem or postulate that justifies your solution.

a.

(5x)°

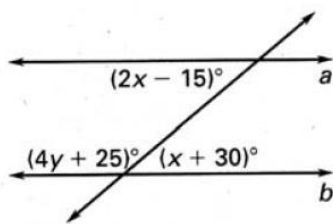(3x+48)°

b.

(5x+23)°   (7x+13)°

c.

(5x-18)°

(8x-5)° m

32. What values of x and y would make lines a and b parallel?
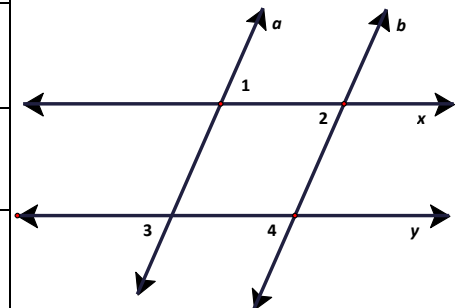
$(2x - 15)°$ a

$(4y + 25)°$ $(x + 30)°$

b

5

33. Given: $m\angle LNF = (3x - 15)°$, $m\angle EFN = (2x + 10)°$, $\overleftrightarrow{LN} \parallel \overrightarrow{EF}$. Please prove: $x = 37$

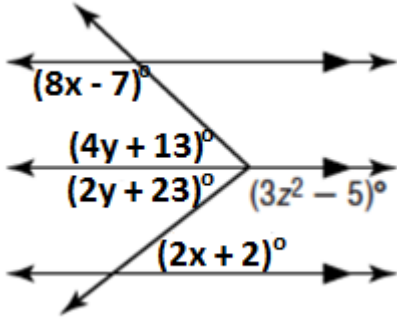| Statements	Reasons
1. $m\angle LNF = (3x - 15)°$ $m\angle EFN = (2x + 10)°$ $\overleftrightarrow{LN} \parallel \overrightarrow{EF}$	1.
2.	2.
3.	3.
4.	4.
5.	5.
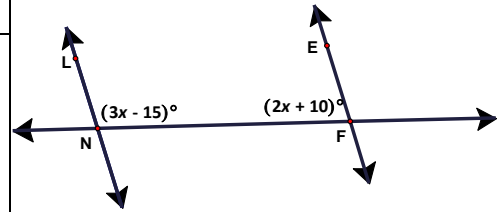
34. Given: $\angle 1 \cong \angle 2$, $\angle 1 \cong \angle 4$. Please prove $x \parallel y$.

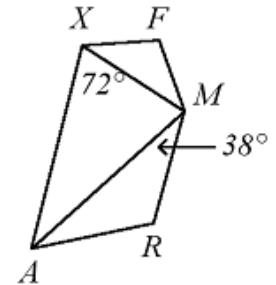| Statements	Reasons
1.	1.
2.	2.
3.	3.
4.	4.
5.	5.
6.	6.

35. Please solve for x, y, and z.

$(8x - 7)^\circ$

$(4y + 13)^\circ$
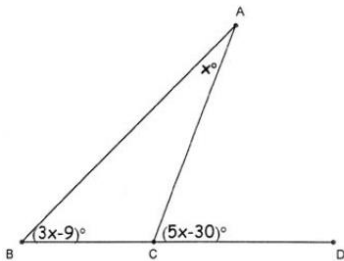
$(2y + 23)^\circ$ $(3z^2 - 5)^\circ$

$(2x + 2)^\circ$

Unit 3

36. In $\triangle ABC,\ m\angle A = (2x-5)^\circ,\ m\angle B = (x-1)^\circ,$ and $m\angle C = (x+2)^\circ$. Classify the triangle by its angles.

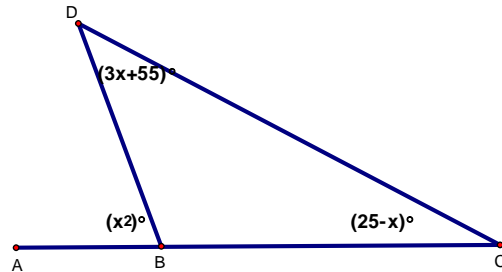37. ΔARM, ΔMAX, and ΔXFM are all isosceles triangles. If $m\angle FXA = 96^\circ,$ what is $m\angle FMR$?

X F

72°

M

38°

A

R

38. a. Find the $m\angle ACD$

A

x°

$(3x-9)^\circ$ $(5x-30)^\circ$

B C D

b. Find all possible measures of $\angle DBC$.

D

$(3x+55)^\circ$

$(x2)^\circ$ $(25-x)^\circ$

A B C

7

39. Find the value of x

(3x + 10)°   60°   50°
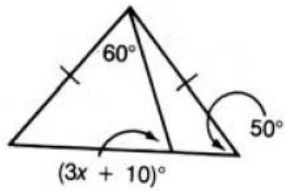
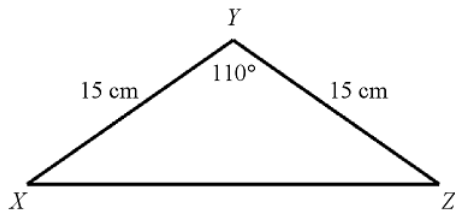40. Find the values of x and y.
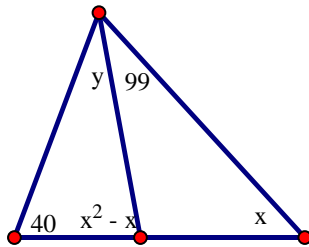
41. How are the interior angle of a triangle and its adjacent exterior angle related?
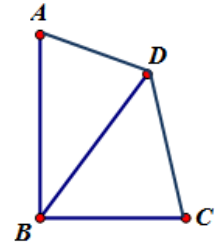   a.   They are complementary angles
   b.   They are supplementary angles
   c.   They are congruent angles
   d.   They are vertical angles

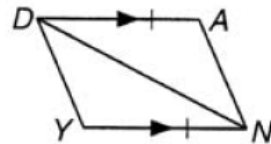42. Classify triangle XYZ according to its angle measures and side lengths.

   Ⓕ   acute, equilateral
   Ⓖ   acute, isosceles
   Ⓗ   obtuse, scalene
   Ⓙ   obtuse, isosceles

43. Given : $\overline{AB} \perp \overline{BC}$, $\overline{BD}$ bisects $\angle ABC$, $m\angle ABD = (x+5y)°$, $m\angle DBC = (2x+2y+3)°$.

Find the values of x and y.

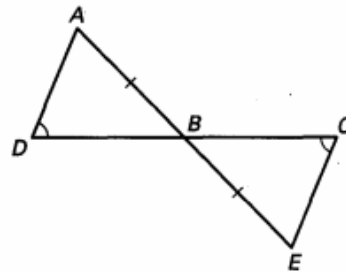44. Given: $\overline{DA} \parallel \overline{YN}$; $\overline{DA} \cong \overline{YN}$

Prove: $\angle NDY \cong \angle DNA$

Statements	Reasons
1.	1.
2.	2.
3.	3.
4.	4.
5.	5.
6.	6.

45. Use the given information to write a proof.

Prove : $\overline{DB} \cong \overline{CB}$

Statements	Reasons
1.	1.
2.	2.
3.	3.
4.	4.
5.	5.

9

46. Given: $\overline{GH} \cong \overline{KJ}$, $\overline{KG} \perp \overline{GH}$ and $\overline{KJ} \perp \overline{JH}$

Prove : ΔGHK ≅ ΔJKH
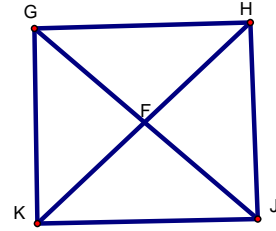
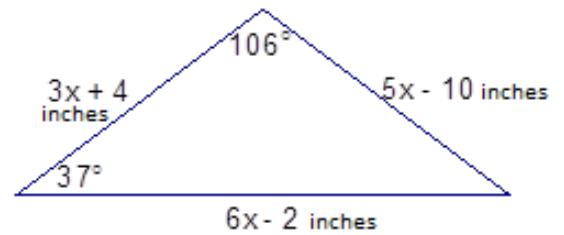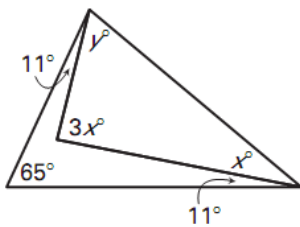| Statements	Reasons
1.	1.
2.	2.
3.	3.
4.	4.
5.	5.

47. Which of the following methods is NOT a method for proving triangle congruence?
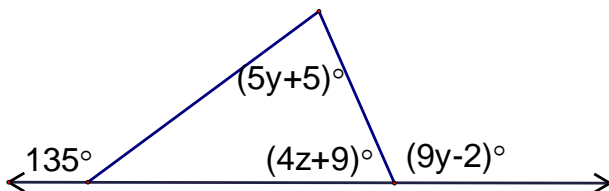
a. SSS

b. SAS

c. AAS

d. SSA

48. Using the given information, please solve for the value of x and find the perimeter of the triangle.

49. Please find the values of x and y.

50. Please find the values of y and z.

Unit 4

51. If $\frac{3}{x-4} = \frac{x}{7}$, find the possible values of x.

52. Find the geometric mean of 15 and 9 in simplest radical form.

53. The measures of the angles of a triangle are in the extended ratio of 5:9:10. Find the measures of the angles of the triangle.

54. The area of a rectangle is 294 yards². The length and width are in the ratio of 3 : 2. Please find the length, width, and perimeter of the rectangle.

55. The side lengths in $\triangle XYZ$ are related in an extended ratio of XY:YZ:XZ : 7:10:14. Please solve for b and c.
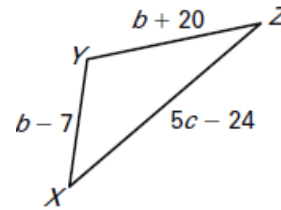
56. The hexagons below, ABCDEF and JKLGHI, are similar. If CD = 6, LG = 9, and the perimeter of ABCDEF is 40, what is the perimeter of JKLGHI?
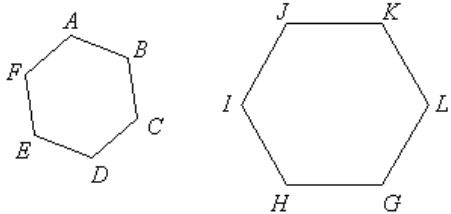
57. A building casts a shadow 174 meters long. At the same time, a pole 5 meters high casts a shadow 15 meters long. What is the height of the building?

58. Michelle wanted to measure the height of her school's flagpole. She placed a mirror on the ground 48 feet from the flagpole, then walked backwards until she was able to see the top of the pole in the mirror. Her eyes were 5 feet above the ground and she was 12 feet from the mirror. Please find the height of the flagpole.
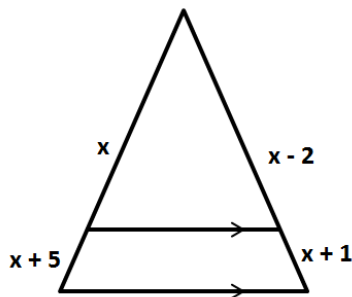
59. Campsites F and G are on opposite sides of a lake. A survey crew made the measurements shown on the diagram. Assuming that the segments formed by $\overline{AB}$ and $\overline{FG}$ are parallel, please explain why the triangles are similar and find the distance between the two campsites?
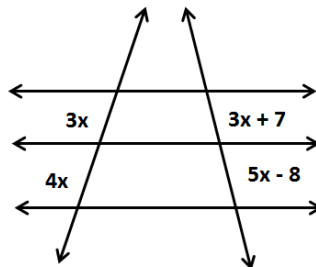**Note: The diagram is not to scale.**
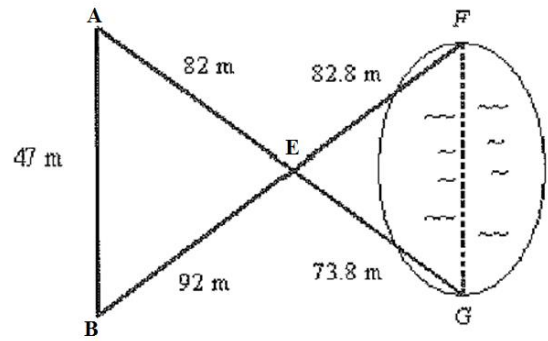
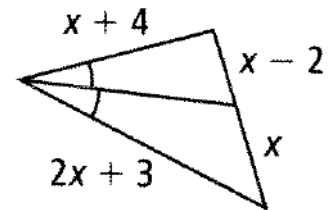

60. Please use the diagrams below to solve for x.

a.

b.

c.

61. In $\triangle RST$, RS = 10, RT = 15, and $m\angle R = 32°$. In $\triangle UVW$, UV = 12, UW = 18, and $m\angle U = 32°$. Are these triangles similar? If so, explain why and write a similarity statement.

62. Is a dilation by a scale factor of $\frac{2}{3}$ an enlargement or a reduction? How can you tell?

63. Is a dilation by a scale factor of 5 an enlargement or a reduction? How can you tell?

64. What are the coordinates of the polygon A(1,5) B(3,3) C(2,−6) D(−4,−2) after it is dilated by a scale factor of 4?

65. What are the coordinates of the polygon A(−4,8) B(2,4) C(0,2) D(−4,6) after it is dilated by a scale factor of $\frac{1}{2}$?

66. $\triangle$DEF has coordinates D(0, 5), E(4, 1) and F(2, 1). Please dilate the triangle using center (-1, 2) and a scale factor of 2.
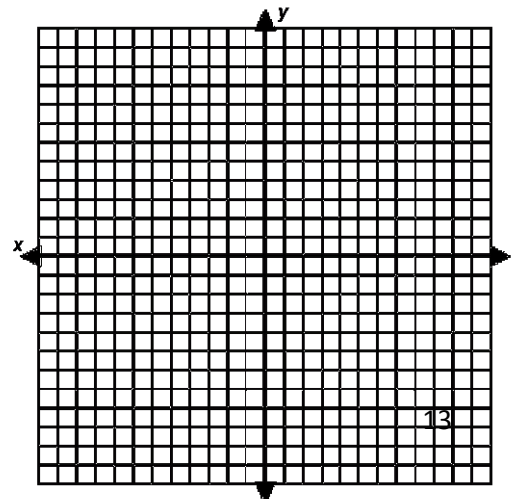
67. Find the coordinates of the dilation image of $\triangle GHJ$ centered at the point (2, 4) with a scale factor of ½ given coordinates G(-8, 2), H(-2, 2), and J(-4, -4).
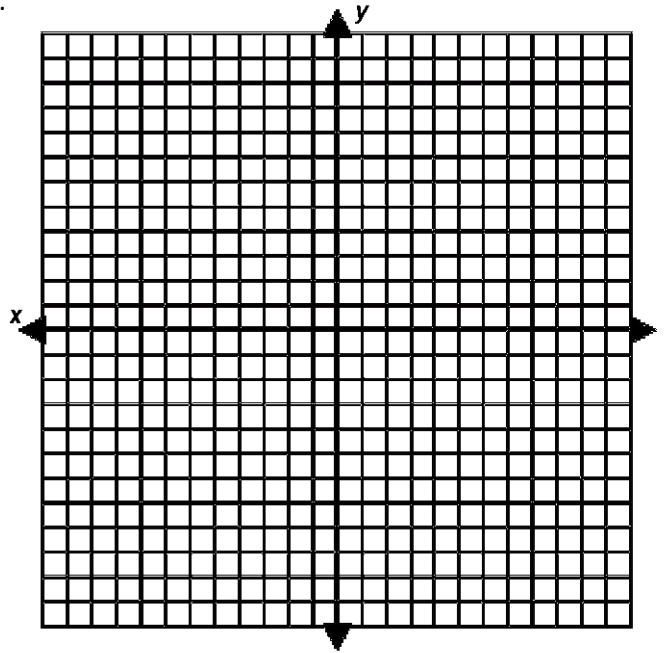
68. Find the coordinates of the dilation image of $\overline{ST}$ centered at point (-3, 4) with a scale factor of 2 given coordinates S(1, 3) and T(-1, 4).