مراجعة اختبار مع الحلول (محلول)





تم تحميل هذا الملف من موقع المناهج الإماراتية	
موقع المناهج ⇦ المناهج الإماراتية ⇦ الصف العاشر المتقدم ⇦ رياضيات ⇦ الفصل الأول ⇦ ملفات متنوعة ⇦ الملف	
تاريخ إضافة الملف على موقع المناهج: 2026-11-15 19:50:25	
ملفات ا كتب للمعلم ا كتب للطالب ا اختبارات الكترونية ا اختبارات ا حلول ا عروض بوربوينت ا أوراق عمل منهج انجليزي ا ملخصات وتقارير ا مذكرات وبنوك ا الامتحان النهائي ا للمدرس	المزيد من مادة رياضيات:
إعداد: Abdelkader Elsayed	

التواصل الاجتماعي بحسب الصف العاشر المتقدم					
صفحة المناهج الإماراتية على فيسبوك					
المواد على تلغرام	التربية الاسلامية	اللغة العربية	اللغة الانجليزية	الرياضيات	

المزيد من الملفات بحسب الصف العاشر المتقدم والمادة رياضيات في الفصل الأول	
1	هيكل مراجعة – أسئلة متعددة الخيارات
2	هيكل امتحان – الجزء الإلكتروني
3	أسئلة تدريبية في كثيرات الحدود
4	هيكل اختبار نهاية الفصل (غير محلول)
5	هيكل اختبار نهاية الفصل (محلول)

تحميل تطبيق المناهج للهواتف الذكية	
تطبيق المناهج على Store App (آبل)	تطبيق المناهج على Play Google (أندرويد)

Mathematics Exam Revision - Solutions

Grade 10 Advanced • Term 1

200 solved questions

Part A • Multiple Choice

The correct choice is highlighted in green. A-D options remain large and are arranged vertically.

Part B • Worked Solutions

Complete methods and final answers for all 54 free-response questions, including all possible triangles in the Law of Sines questions.

Question numbers match the student revision booklet.

Polynomials

1. Write in standard form and identify the leading coefficient.
$-y^3 + 3y - 3y^2 + 2$

A. $-y^3 - 8y^2 + 3y + 2$; -1

B. $-y^3 - 3y^2 + 3y + 2$; -1

C. $-y^3 - 5y^2 + 3y + 2$; -1

D. $-y^3 - 1y^2 + 3y + 2$; -1

Correct answer: B

2. Write in standard form and identify the leading coefficient.
$11t + 2t^2 - 3 + t^5$

A. $t^5 + 2t^2 + 11t - 3$; 1

B. $t^5 + 4t^2 + 11t - 3$; 1

C. $t^5 + 0t^2 + 11t - 3$; 1

D. $t^5 + 7t^2 + 11t - 3$; 1

Correct answer: A

3. Write in standard form and identify the leading coefficient.
$2 + r - r^3$

A. $-r^3 + r + 4$; -1

B. $-r^3 + r + 0$; -1

C. $-r^3 + r + 7$; -1

D. $-r^3 + r + 2$; -1

Correct answer: D

Polynomials

4. Write in standard form and identify the leading coefficient.
½x - 3x⁴ + 7

A. -5x⁴ + ½x + 7; -3

B. 2x⁴ + ½x + 7; -3

C. -3x⁴ + ½x + 7; -3

D. -1x⁴ + ½x + 7; -3

Correct answer: C

5. Write in standard form and identify the leading coefficient.
-9b² + 10b - b⁶

A. -b⁶ - 14b² + 10b; -1

B. -b⁶ - 9b² + 10b; -1

C. -b⁶ - 11b² + 10b; -1

D. -b⁶ - 7b² + 10b; -1

Correct answer: B

6. Find the sum or difference.
(2h² - 5h) + (7h - 3h²)

A. -h² + 7h

B. -h² + 2h

C. -h² + 4h

D. -h² + 0h

Correct answer: B

Polynomials

7. Find the sum or difference.
(5f + g - 2) + (-2f + 3)

A. 3f + g + 1

B. 5f + g + 1

C. 1f + g + 1

D. 8f + g + 1

Correct answer: A

8. Find the sum or difference.
$(6k^2 + 2k + 9) + (4k^2 - 5k)$

A. $12k^2 - 3k + 9$

B. $8k^2 - 3k + 9$

C. $15k^2 - 3k + 9$

D. $10k^2 - 3k + 9$

Correct answer: D

9. Find the sum or difference.
$(2c^2 + 6c + 4) + (5c^2 - 7)$

A. $5c^2 + 6c - 3$

B. $12c^2 + 6c - 3$

C. $7c^2 + 6c - 3$

D. $9c^2 + 6c - 3$

Correct answer: C

Polynomials

10. Find the sum or difference.
$(2x + 3x^2) - (7 - 8x^2)$

A. $16x^2 + 2x - 7$

B. $11x^2 + 2x - 7$

C. $13x^2 + 2x - 7$

D. $9x^2 + 2x - 7$

Correct answer: B

Multiplying Binomials

11. Find the product.
$(3c - 5)(c + 3)$

A. $8c^2 + 4c - 15$

B. $3c^2 + 4c - 15$

C. $5c^2 + 4c - 15$

D. $1c^2 + 4c - 15$

Correct answer: B

12. Find the product.
$(g + 10)(2g - 5)$

A. $2g^2 + 15g - 50$

B. $4g^2 + 15g - 50$

C. $0g^2 + 15g - 50$

D. $7g^2 + 15g - 50$

Correct answer: A

13. Find the product.
$(6a + 5)(5a + 3)$

A. $32a^2 + 43a + 15$

B. $28a^2 + 43a + 15$

C. $35a^2 + 43a + 15$

D. $30a^2 + 43a + 15$

Correct answer: D

Multiplying Binomials

14. Find the product.
$(4x + 1)(6x + 3)$

A. $22x^2 + 18x + 3$

B. $29x^2 + 18x + 3$

C. $24x^2 + 18x + 3$

D. $26x^2 + 18x + 3$

Correct answer: C

15. Find the product.
$(5y - 4)(3y - 1)$

A. $20y^2 - 17y + 4$

B. $15y^2 - 17y + 4$

C. $17y^2 - 17y + 4$

D. $13y^2 - 17y + 4$

Correct answer: B

16. Find the product.
$(6d - 5)(4d - 7)$

A. $24d^2 - 62d + 35$

B. $26d^2 - 62d + 35$

C. $22d^2 - 62d + 35$

D. $29d^2 - 62d + 35$

Correct answer: A

Factoring by Grouping

17. Factor the polynomial.
fg - 5g + 4f - 20

A. (f - 3)(g + 4)

B. (f - 10)(g + 4)

C. (f - 5)(g + 4)

D. (f - 7)(g + 4)

Correct answer: C

18. Factor the polynomial.
a^2 - 4a - 24 + 6a

A. (a + 11)(a - 4)

B. (a + 6)(a - 4)

C. (a + 8)(a - 4)

D. (a + 4)(a - 4)

Correct answer: B

19. Factor the polynomial.
hj - 2h + 5j - 10

A. (h + 5)(j - 2)

B. (h + 7)(j - 2)

C. (h + 3)(j - 2)

D. (h + 10)(j - 2)

Correct answer: A

Factoring by Grouping

20. Factor the polynomial.
xy - 2x - 2 + y

A. (x + 3)(y - 2)

B. (x - 1)(y - 2)

C. (x + 6)(y - 2)

D. (x + 1)(y - 2)

Correct answer: D

21. Factor the polynomial.
45pq - 27q - 50p + 30

A. (7q - 10)(5p - 3)

B. (14q - 10)(5p - 3)

C. (9q - 10)(5p - 3)

D. (11q - 10)(5p - 3)

Correct answer: C

22. Factor the polynomial.
24tv - 18t + 4v - 3

A. (11t + 1)(4v - 3)

B. (6t + 1)(4v - 3)

C. (8t + 1)(4v - 3)

D. (4t + 1)(4v - 3)

Correct answer: B

Factoring by Grouping

23. Factor the polynomial.
$3dt - 21d + 35 - 5t$

A. $(3d - 5)(t - 7)$

B. $(5d - 5)(t - 7)$

C. $(1d - 5)(t - 7)$

D. $(8d - 5)(t - 7)$

Correct answer: A

24. Factor the polynomial.
$8r^2 + 12r$

A. $6r(2r + 3)$

B. $2r(2r + 3)$

C. $9r(2r + 3)$

D. $4r(2r + 3)$

Correct answer: D

25. Factor the polynomial.
$21th - 3t - 35h + 5$

A. $(5h - 1)(3t - 5)$

B. $(12h - 1)(3t - 5)$

C. $(7h - 1)(3t - 5)$

D. $(9h - 1)(3t - 5)$

Correct answer: C

Factoring by Grouping

26. Factor the polynomial.
$vp + 12v + 8p + 96$

A. $(v + 13)(p + 12)$

B. $(v + 8)(p + 12)$

C. $(v + 10)(p + 12)$

D. $(v + 6)(p + 12)$

Correct answer: B

Factoring Trinomials

27. Factor the polynomial, if possible.
$x^2 + 17x + 42$

A. $(x + 5)(x + 14)$

B. $(x + 1)(x + 14)$

C. $(x + 8)(x + 14)$

D. $(x + 3)(x + 14)$

Correct answer: D

28. Factor the polynomial, if possible.
$y^2 - 17y + 72$

A. $(y - 6)(y - 9)$

B. $(y - 13)(y - 9)$

C. $(y - 8)(y - 9)$

D. $(y - 10)(y - 9)$

Correct answer: C

29. Factor the polynomial, if possible.
$a^2 + 8a - 48$

A. $(a + 17)(a - 4)$

B. $(a + 12)(a - 4)$

C. $(a + 14)(a - 4)$

D. $(a + 10)(a - 4)$

Correct answer: B

Factoring Trinomials

30. Factor the polynomial, if possible.
$n^2 - 2n - 35$

A. $(n - 7)(n + 5)$

B. $(n - 9)(n + 5)$

C. $(n - 5)(n + 5)$

D. $(n - 12)(n + 5)$

Correct answer: A

31. Factor the polynomial, if possible.
$44 + 15h + h^2$

A. $(h + 6)(h + 11)$

B. $(h + 2)(h + 11)$

C. $(h + 9)(h + 11)$

D. $(h + 4)(h + 11)$

Correct answer: D

32. Factor the polynomial, if possible.
$40 - 22x + x^2$

A. $(x - 0)(x - 20)$

B. $(x - 7)(x - 20)$

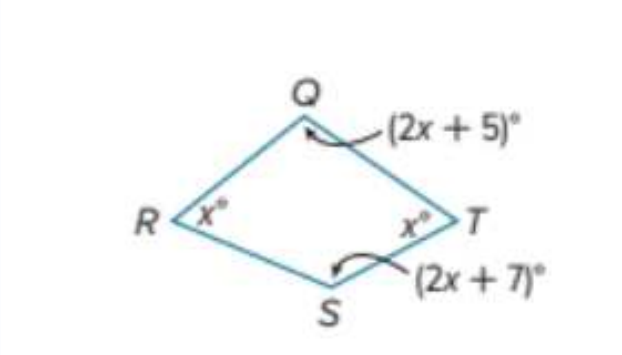
C. $(x - 2)(x - 20)$

D. $(x - 4)(x - 20)$

Correct answer: C

Interior Angles

33. Find the measure of each interior angle.



A. Q=119°, R=58°, S=123°, T=58°

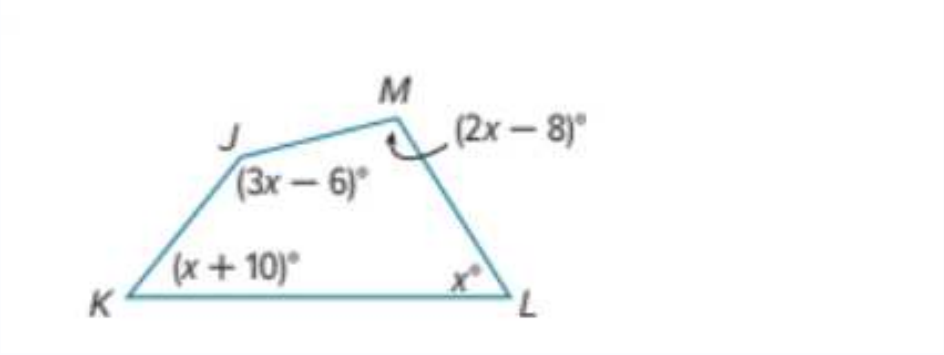
B. Q=126°, R=58°, S=123°, T=58°

C. Q=121°, R=58°, S=123°, T=58°

D. Q=123°, R=58°, S=123°, T=58°

Correct answer: C

34. Find the measure of each interior angle.



A. J=155°, K=62°, L=52°, M=96°

B. J=150°, K=62°, L=52°, M=96°

C. J=152°, K=62°, L=52°, M=96°

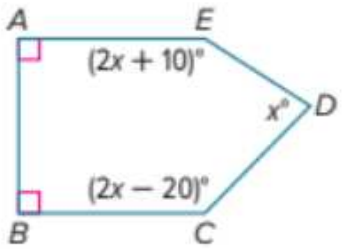
D. J=148°, K=62°, L=52°, M=96°

Correct answer: B

Interior Angles

35. Find the measure of each interior angle.

3.



A. A=90°, B=90°, C=128°, D=74°, E=158°

B. A=92°, B=90°, C=128°, D=74°, E=158°

C. A=88°, B=90°, C=128°, D=74°, E=158°

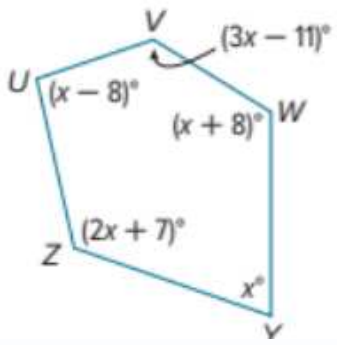
D. A=95°, B=90°, C=128°, D=74°, E=158°

Correct answer: A

Interior Angles

36. Find the measure of each interior angle.

4.



A. U=62°, V=193°, W=76°, Y=68°, Z=143°

B. U=58°, V=193°, W=76°, Y=68°, Z=143°

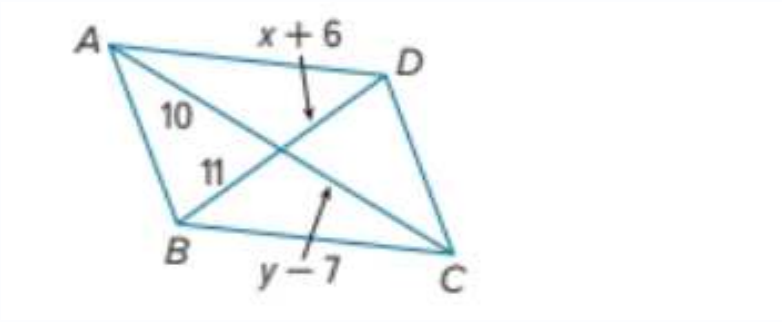
C. U=65°, V=193°, W=76°, Y=68°, Z=143°

D. U=60°, V=193°, W=76°, Y=68°, Z=143°

Correct answer: D

Parallelograms

37. Find the value of each variable in the parallelogram.



A. x=10, y=17

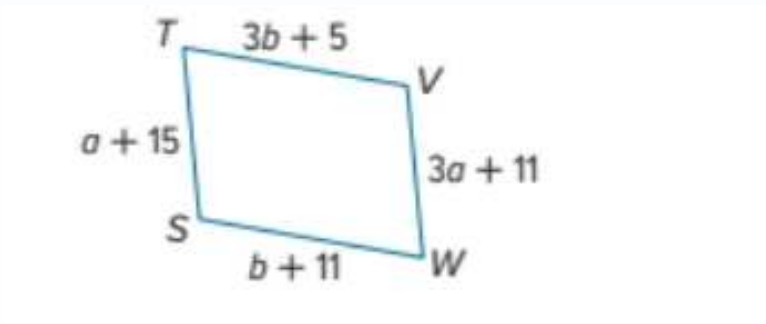
B. x=5, y=17

C. x=7, y=17

D. x=3, y=17

Correct answer: B

38. Find the value of each variable in the parallelogram.



A. a=2, b=3

B. a=4, b=3

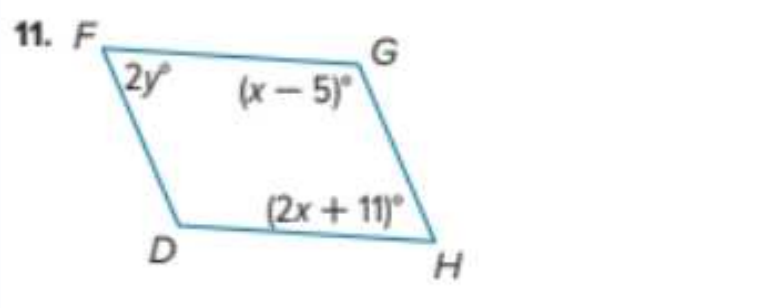
C. a=0, b=3

D. a=7, b=3

Correct answer: A

Parallelograms

39. Find the value of each variable in the parallelogram.



A. x=60, y=63.5

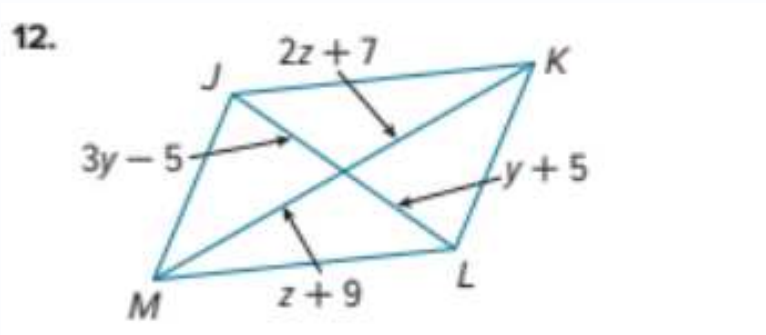
B. x=56, y=63.5

C. x=63, y=63.5

D. x=58, y=63.5

Correct answer: D

40. Find the value of each variable in the parallelogram.



A. y=3, z=2

B. y=10, z=2

C. y=5, z=2

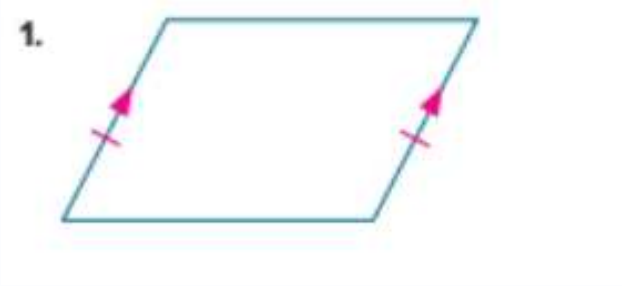
D. y=7, z=2

Correct answer: C

Tests for Parallelograms

41. Is the quadrilateral a parallelogram? Select the conclusion and reason.

1.



A. Yes; one pair of opposite sides is both parallel and congruent.

B. No; only one pair of opposite sides is congruent.

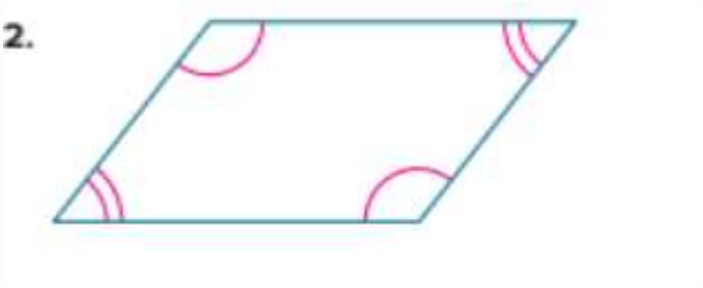
C. No; only one pair of opposite sides is parallel.

D. Yes; one pair of adjacent sides is congruent.

Correct answer: A

42. Is the quadrilateral a parallelogram? Select the conclusion and reason.

2.



A. No; opposite angles must be supplementary.

B. Yes; one pair of adjacent angles is congruent.

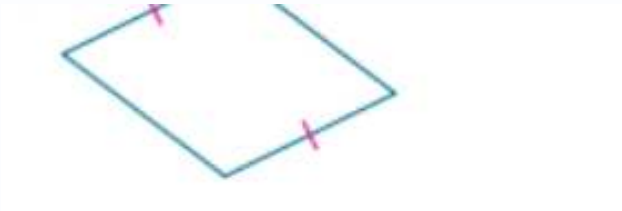
C. No; the diagonals must be congruent.

D. Yes; both pairs of opposite angles are congruent.

Correct answer: D

Tests for Parallelograms

43. Is the quadrilateral a parallelogram? Select the conclusion and reason.



A. Yes; each pair of adjacent sides is congruent.

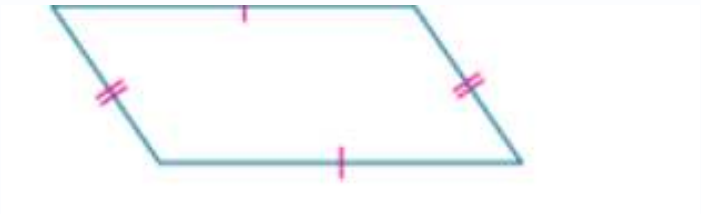
B. No; opposite sides of a parallelogram cannot be congruent.

C. No; one pair of congruent opposite sides is insufficient.

D. Yes; one pair of congruent opposite sides is sufficient.

Correct answer: C

44. Is the quadrilateral a parallelogram? Select the conclusion and reason.



A. No; all four sides must be congruent.

B. Yes; both pairs of opposite sides are congruent.

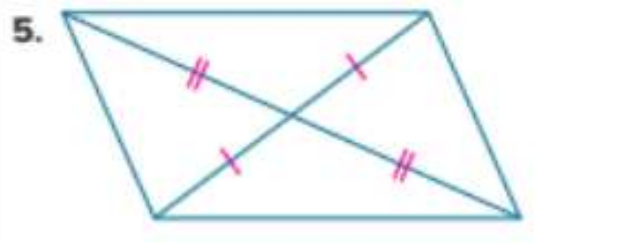
C. No; parallel sides must have different lengths.

D. Yes; the diagonals are congruent.

Correct answer: B

Tests for Parallelograms

45. Is the quadrilateral a parallelogram? Select the conclusion and reason.



A. Yes; the diagonals bisect each other.

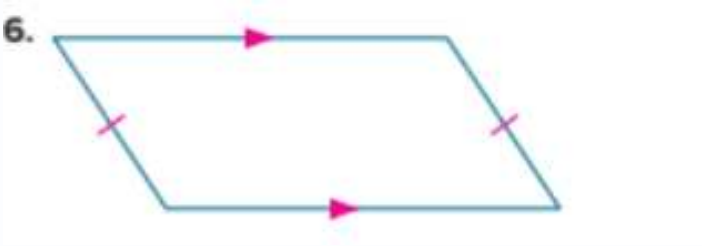
B. No; diagonals must be perpendicular.

C. Yes; diagonals have equal total lengths.

D. No; congruent diagonal halves are insufficient.

Correct answer: A

46. Is the quadrilateral a parallelogram? Select the conclusion and reason.



A. Yes; one parallel pair and a different congruent pair are sufficient.

B. Yes; the diagonals bisect each other.

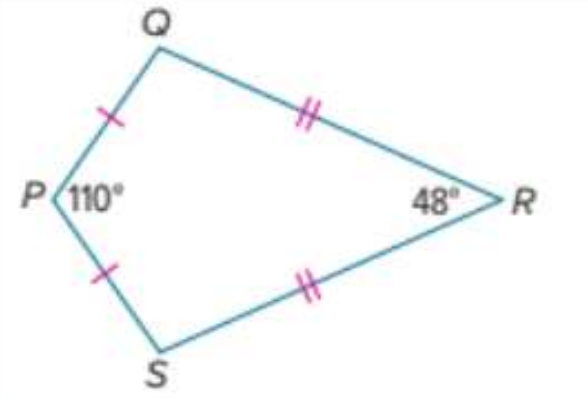
C. Yes; all opposite angles are marked congruent.

D. No; the marked parallel and congruent pairs are different pairs.

Correct answer: D

Kites

47. Find m∠Q.



A. 103°

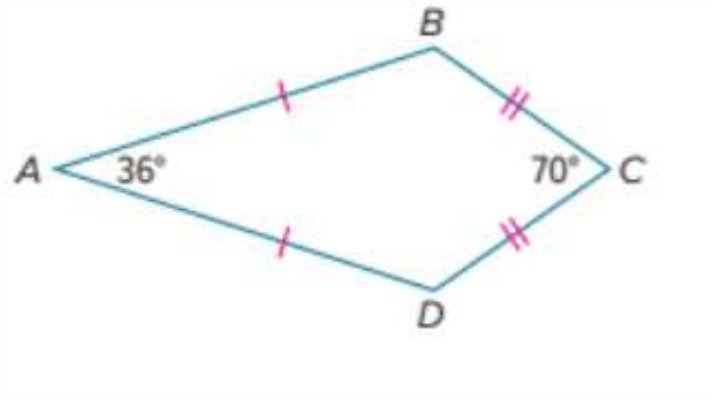
B. 99°

C. 106°

D. 101°

Correct answer: D

48. Find m∠D.



A. 125°

B. 132°

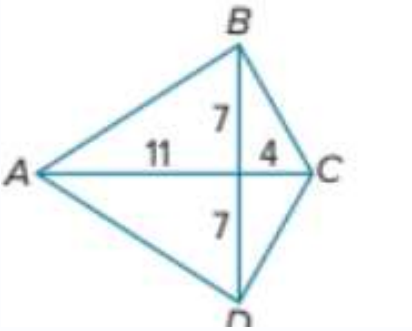
C. 127°

D. 129°

Correct answer: C

Kites

49. Quadrilateral ABCD is a kite.
a. Find BC. Write your answer in simplest radical form.
b. Find the perimeter of kite ABCD. Round your answer to the nearest tenth, if necessary.



A. BC=√70; perimeter≈42.2

B. BC=√65; perimeter≈42.2

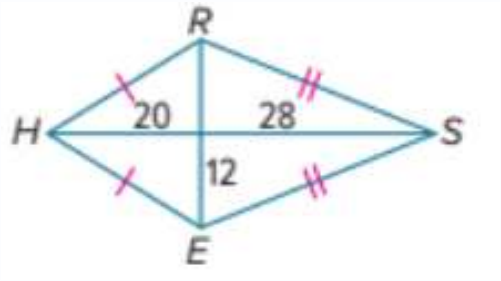
C. BC=√67; perimeter≈42.2

D. BC=√63; perimeter≈42.2

Correct answer: B

Kites

50. Quadrilateral HRSE is a kite.
a. Find RH. Write your answer in simplest radical form.
b. Find the perimeter of kite HRSE. Round your answer to the nearest tenth, if necessary.



A. RH=4√34; perimeter≈107.6

B. RH=6√34; perimeter≈107.6

C. RH=2√34; perimeter≈107.6

D. RH=9√34; perimeter≈107.6

Correct answer: A

Dilations

51. Graph the image after a dilation centered at the origin. Select the image coordinates.
F(-10, 4), G(-4, 4), H(-4, -8); k = 0.25.

A. F′(-4.5,1), G′(-1,1), H′(-1,-2)

B. F′(2.5,1), G′(-1,1), H′(-1,-2)

C. F′(-2.5,1), G′(-1,1), H′(-1,-2)

D. F′(-0.5,1), G′(-1,1), H′(-1,-2)

Correct answer: C

52. Graph the image after a dilation centered at the origin. Select the image coordinates.
X(2, -1), Y(-6, 4), Z(-2, -5); k = 5/4.

A. X′(7.5,-1.25), Y′(-7.5,5), Z′(-2.5,-6.25)

B. X′(2.5,-1.25), Y′(-7.5,5), Z′(-2.5,-6.25)

C. X′(4.5,-1.25), Y′(-7.5,5), Z′(-2.5,-6.25)

D. X′(0.5,-1.25), Y′(-7.5,5), Z′(-2.5,-6.25)

Correct answer: B

53. Graph the image after a dilation centered at the origin. Select the image coordinates.
M(4, 6), N(-6, 2), P(0, -8); k = 3/4.

A. M′(3,4.5), N′(-4.5,1.5), P′(0,-6)

B. M′(5,4.5), N′(-4.5,1.5), P′(0,-6)

C. M′(1,4.5), N′(-4.5,1.5), P′(0,-6)

D. M′(8,4.5), N′(-4.5,1.5), P′(0,-6)

Correct answer: A

Dilations

54. Graph the image after a dilation centered at the origin. Select the image coordinates.
R(-2, 6), S(0, -1), T(-5, 3); k = 1.5.

A. R′(-1,9), S′(0,-1.5), T′(-7.5,4.5)

B. R′(-5,9), S′(0,-1.5), T′(-7.5,4.5)

C. R′(2,9), S′(0,-1.5), T′(-7.5,4.5)

D. R′(-3,9), S′(0,-1.5), T′(-7.5,4.5)

Correct answer: D

55. △ABC has vertices A(2, 2), B(3, 4), and C(5, 2). What are the coordinates of point C of the image of the triangle after a dilation centered at the origin with a scale factor of 2.5?

A. C′(14.5,5)

B. C′(10.5,5)

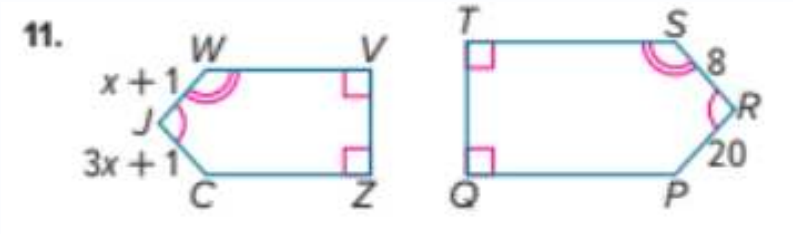
C. C′(17.5,5)

D. C′(12.5,5)

Correct answer: D

Similar Polygons

56. The polygons are similar. Find x.



A. 5

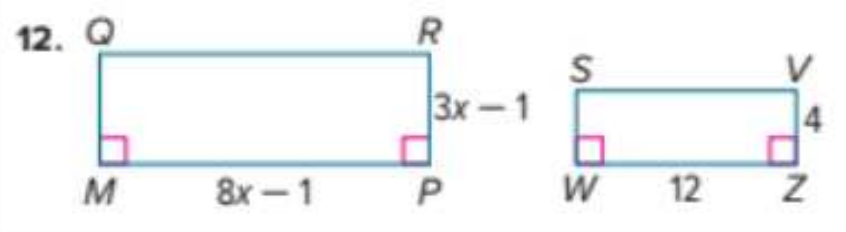
B. 1

C. 8

D. 3

Correct answer: D

57. The polygons are similar. Find x.



A. 0

B. 7

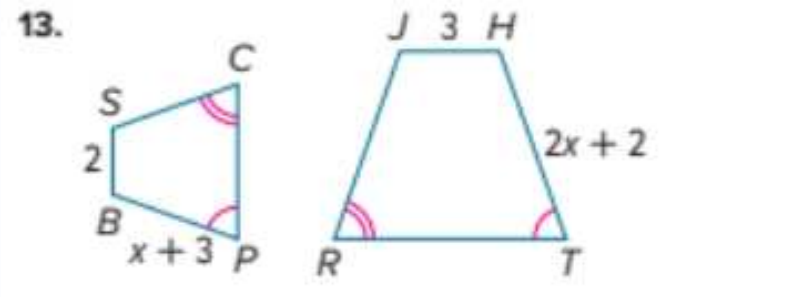
C. 2

D. 4

Correct answer: C

Similar Polygons

58. The polygons are similar. Find x.



A. 10

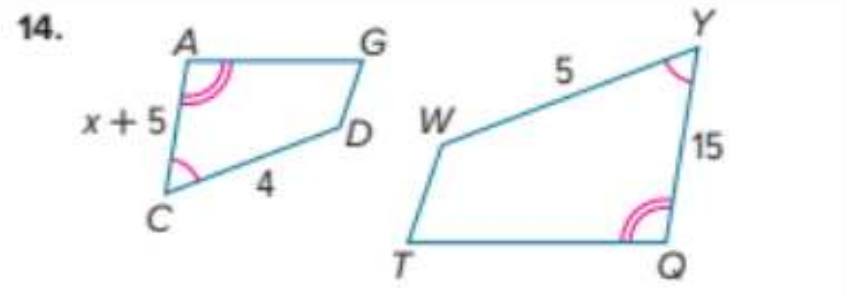
B. 5

C. 7

D. 3

Correct answer: B

59. The polygons are similar. Find x.



A. 7

B. 9

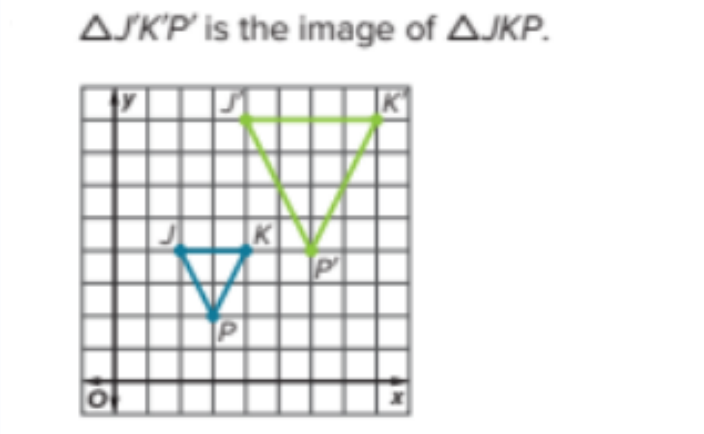
C. 5

D. 12

Correct answer: A

Scale Factors

60. Find the scale factor of the dilation.



A. 4

B. 0

C. 7

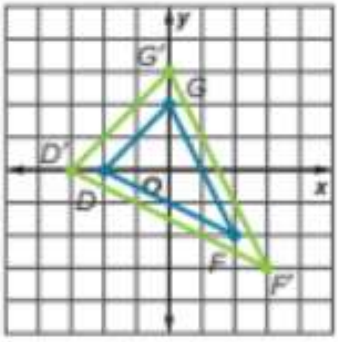
D. 2

Correct answer: D

Scale Factors

61. Find the scale factor of the dilation.

11. $\triangle D'F'G'$ is the image of $\triangle DFG$.



A. -0.5

B. 6.5

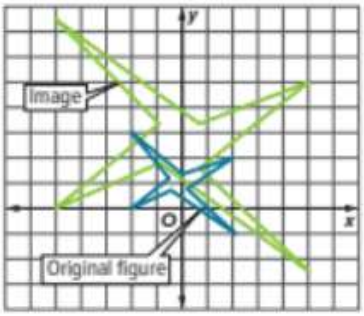
C. 1.5

D. 3.5

Correct answer: C

62. Find the scale factor of the dilation.

Tyrone drew a logo and a dilation of the same logo on the coordinate plane. What is the scale factor of the dilation?



A. 7.5

B. 2.5

C. 4.5

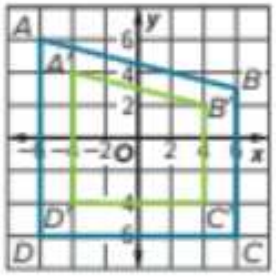
D. 0.5

Correct answer: B

Scale Factors

63. Find the scale factor of the dilation.

$A'B'C'D'$ is the image of $ABCD$.



A. ⅔

B. ⅓

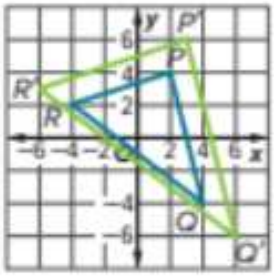
C. 3/2

D. 2

Correct answer: A

64. Find the scale factor of the dilation.

$\triangle P'Q'R'$ is the image of $\triangle PQR$.



A. 3.5

B. -0.5

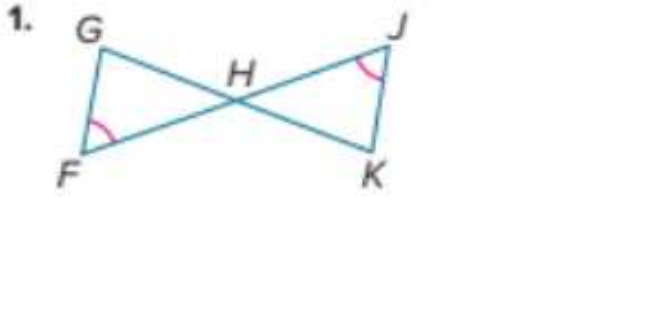
C. 6.5

D. 1.5

Correct answer: D

Similar Triangles

65. Are the triangles similar? Select the conclusion and reason.



A. No; the vertical angles at H are unequal.

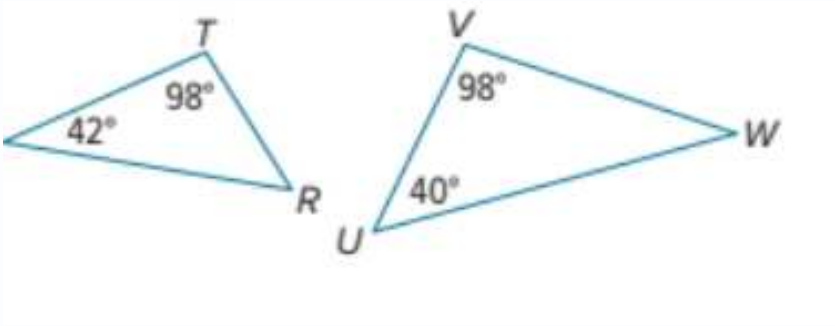
B. Yes; one equal angle pair alone is sufficient.

C. No; the triangles must share a side.

D. Yes; two angle pairs match, including the vertical angles at H.

Correct answer: D

66. Are the triangles similar? Select the conclusion and reason.



A. No; the triangles have different angle sets.

B. Yes; the third angle of each triangle is 40°.

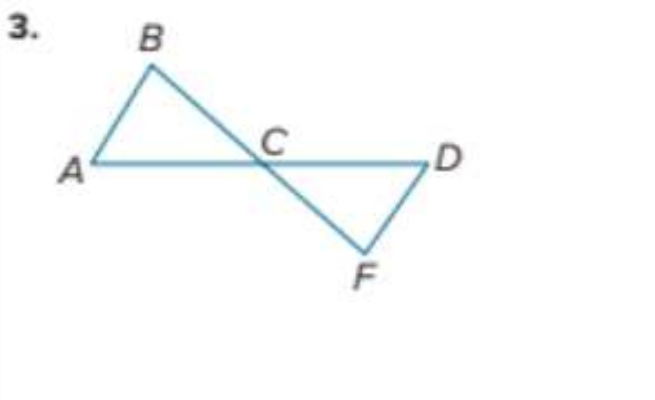
C. Yes; the third angle of each triangle is 42°.

D. No; 98° and 40° leave a third angle of 52°.

Correct answer: C

Similar Triangles

67. Are the triangles similar? Select the conclusion and reason.



A. Yes; the unmarked sides are necessarily proportional.

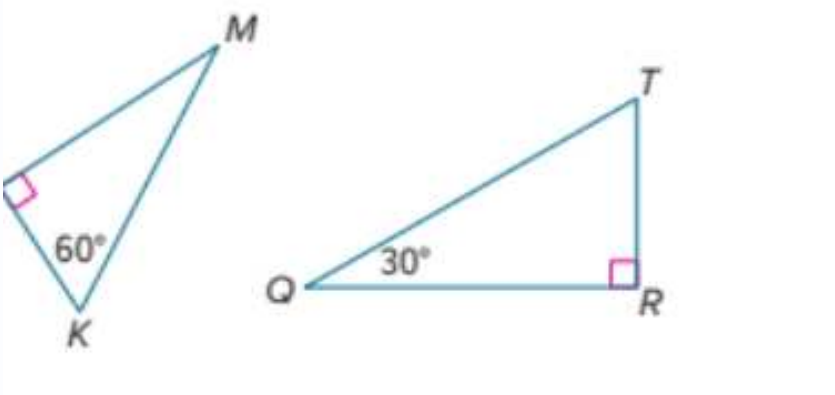
B. Similarity cannot be concluded from the given information.

C. Yes; one pair of vertical angles alone proves similarity.

D. Yes; all triangles on intersecting lines are similar.

Correct answer: B

68. Are the triangles similar? Select the conclusion and reason.



A. Yes; both triangles have angles 30°, 60°, 90°.

B. No; their right angles have different measures.

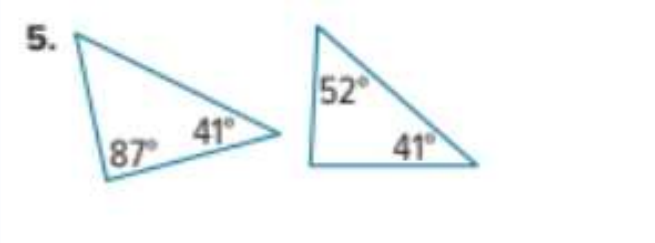
C. Yes; both triangles have angles 30°, 30°, 120°.

D. No; a 60° angle cannot belong to a right triangle.

Correct answer: A

Similar Triangles

69. Are the triangles similar? Select the conclusion and reason.



A. No; the third angle of the left triangle is 42°.

B. No; only one angle pair matches.

C. Yes; both triangles have angles 87°, 41°, 62°.

D. Yes; both triangles have angles 87°, 41°, 52°.

Correct answer: D

70. Are the triangles similar? Select the conclusion and reason.



A. Yes; both figures are triangles.

B. Yes; any pair of scalene triangles is similar.

C. No; the corresponding side lengths are not proportional.

D. Yes; all three side ratios are ¾.

Correct answer: C

Similar Triangles

71. A cell phone tower casts a shadow that is 100 feet long. At the same time, Lia stands near the tower and casts a shadow that is 3 feet 4 inches long. If Lia is 4 feet 6 inches tall, how tall is the cell phone tower?

A. 140 ft

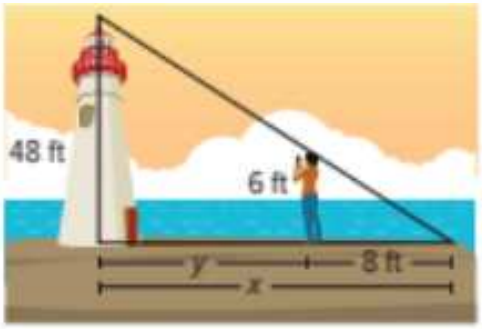
B. 135 ft

C. 137 ft

D. 133 ft

Correct answer: B

72. Maya wants to know how far she is standing from a lighthouse. The end of Maya's shadow coincides with the end of the lighthouse's shadow.
a. What is the distance from the lighthouse to the end of the lighthouse's shadow, x?
b. What is the distance from Maya to the lighthouse, y?



A. x=64 ft, y=56 ft

B. x=66 ft, y=56 ft

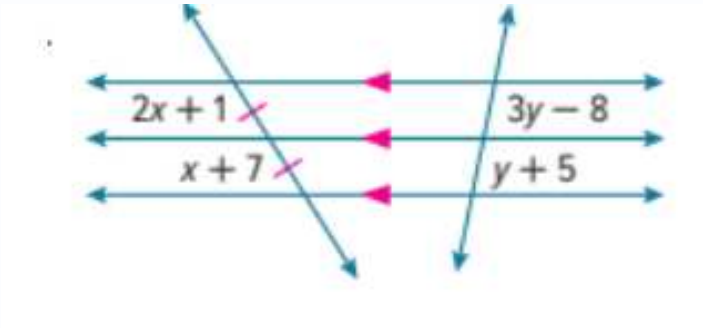
C. x=62 ft, y=56 ft

D. x=69 ft, y=56 ft

Correct answer: A

Proportional Parts

73. Find x and y.



A. x=6, y=6.5

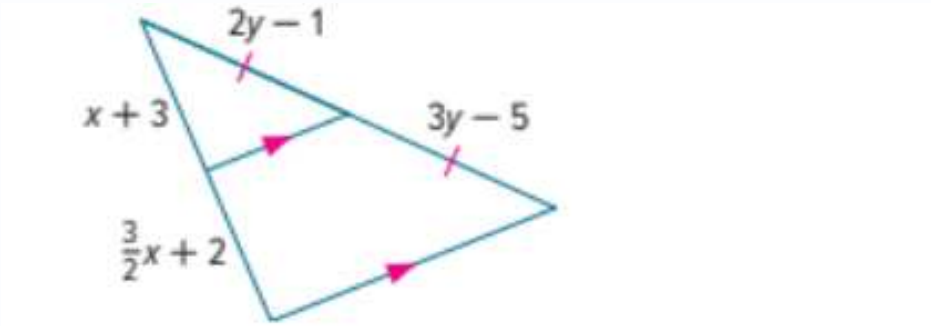
B. x=8, y=6.5

C. x=4, y=6.5

D. x=11, y=6.5

Correct answer: A

74. Find x and y.



A. x=4, y=4

B. x=0, y=4

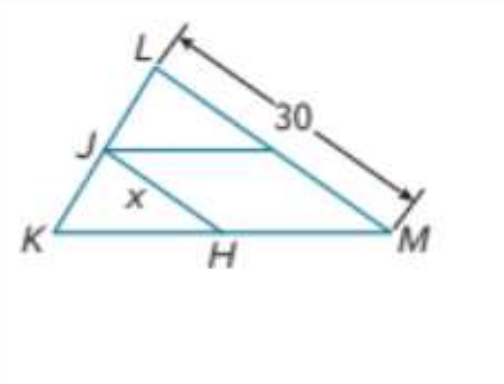
C. x=7, y=4

D. x=2, y=4

Correct answer: D

Proportional Parts

75. JH is a midsegment of △KLM. Find x.



A. 13

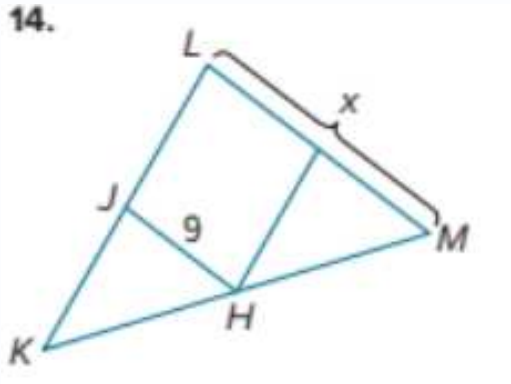
B. 20

C. 15

D. 17

Correct answer: C

76. JH is a midsegment of △KLM. Find x.



A. 23

B. 18

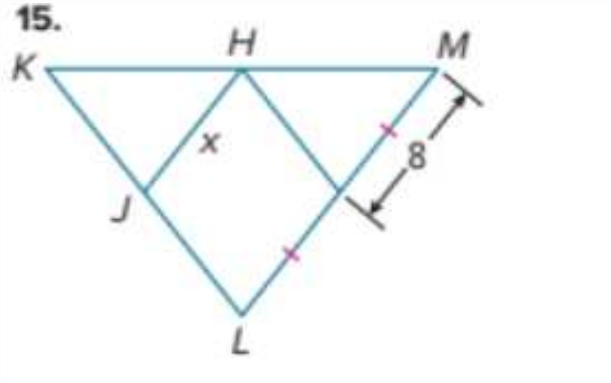
C. 20

D. 16

Correct answer: B

Proportional Parts

77. JH is a midsegment of △KLM. Find x.



A. 8

B. 4

C. 6

D. 16

Correct answer: A

The marked half of LM is 8, so LM = 2 × 8 = 16. Since JH is a midsegment, x = JH = ½LM = ½ × 16 = 8.

78. In △ABC, DE is parallel to AC and DE = 10. Find the length of AC if DE is a midsegment of △ABC.

A. 22

B. 18

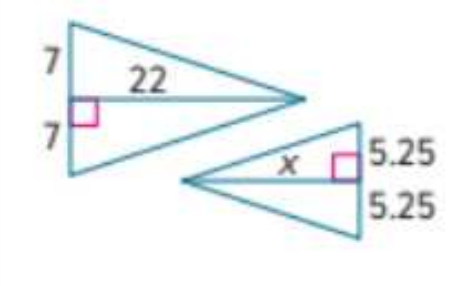
C. 25

D. 20

Correct answer: D

Similar Triangle Relationships

79. The triangles are similar. Find x.



A. 21.5

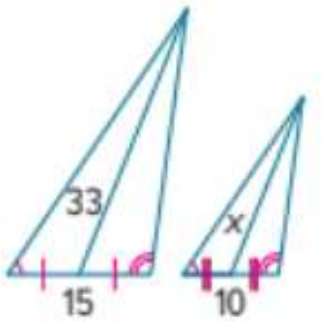
B. 16.5

C. 18.5

D. 14.5

Correct answer: B

80. The triangles are similar. Find x.



A. 22

B. 24

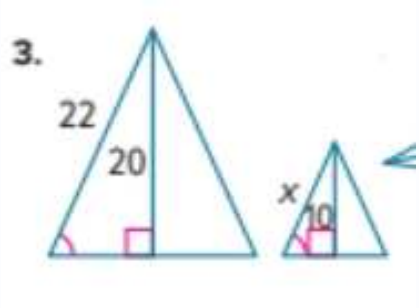
C. 20

D. 27

Correct answer: A

Similar Triangle Relationships

81. The triangles are similar. Find x.



A. 13

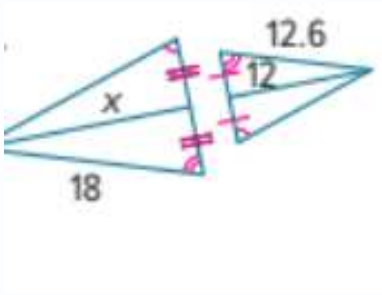
B. 9

C. 16

D. 11

Correct answer: D

82. The triangles are similar. Find x.



A. 118/7

B. 125/7

C. 120/7

D. 122/7

Correct answer: C

Similar Triangle Relationships

83. If △RST ~ △EFG, SH is an altitude of △RST, FJ is an altitude of △EFG, ST = 6, SH = 5, and FJ = 7, find FG.



A. 13.4

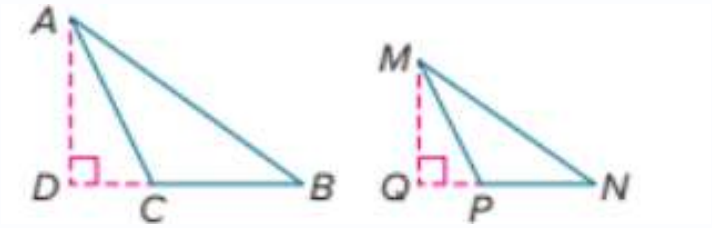
B. 8.4

C. 10.4

D. 6.4

Correct answer: B

84. If △ABC ~ △MNP, AD is an altitude of △ABC, MQ is an altitude of △MNP, AB = 24, AD = 14, and MQ = 10.5, find MN.



A. 18

B. 20

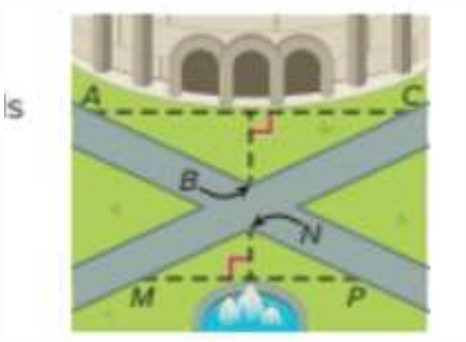
C. 16

D. 23

Correct answer: A

Similar Triangle Relationships

85. The intersection of the two paths shown forms two similar triangles. If AC is 50 yards, MP is 35 yards, and the fountain is 5 yards from the intersection, about how far from the intersection is the stadium entrance? Round to the nearest yard.



A. 9 yd

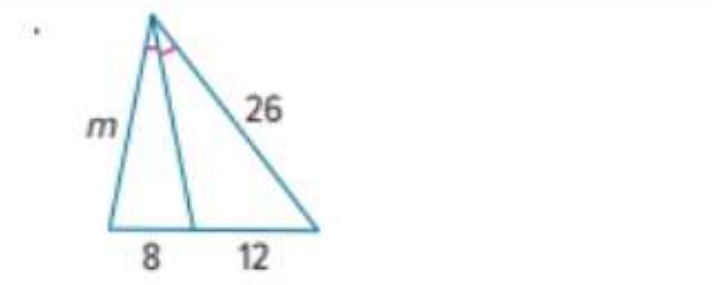
B. 5 yd

C. 12 yd

D. 7 yd

Correct answer: D

86. Find the variable to the nearest tenth.



A. 15.3

B. 22.3

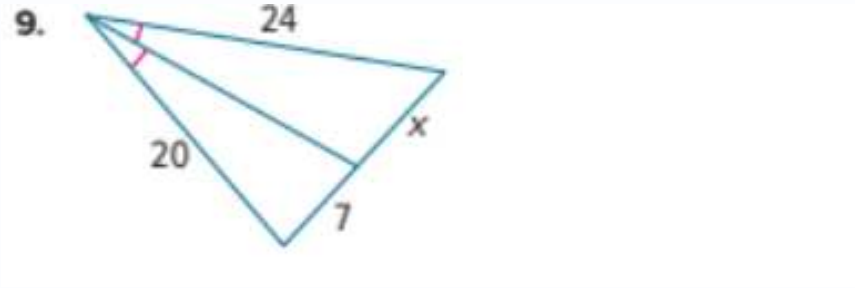
C. 17.3

D. 19.3

Correct answer: C

Similar Triangle Relationships

87. Find the variable to the nearest tenth.



A. 13.4

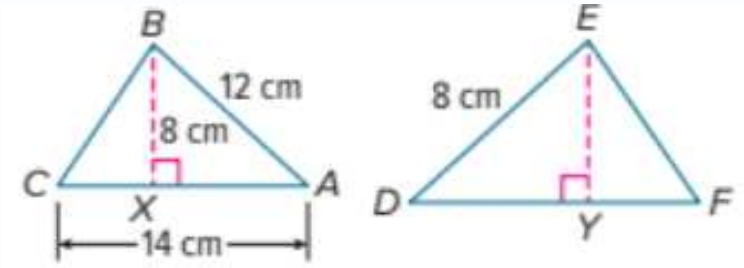
B. 8.4

C. 10.4

D. 6.4

Correct answer: B

88. △ABC ~ △DEF. Find XC to the nearest tenth.



A. 5.1 cm

B. 7.1 cm

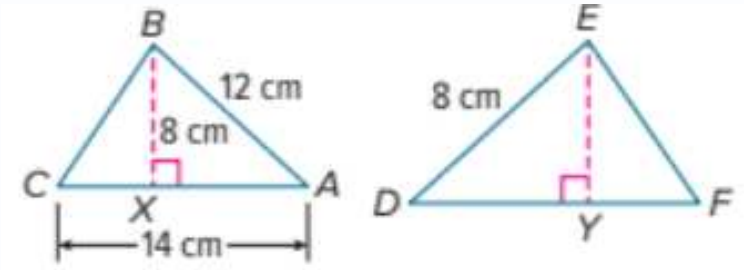
C. 3.1 cm

D. 10.1 cm

Correct answer: A

Similar Triangle Relationships

89. △ABC ~ △DEF. Find EY to the nearest tenth.



A. 7.3 cm

B. 3.3 cm

C. 10.3 cm

D. 5.3 cm

Correct answer: D

Geometric Mean

90. Find the geometric mean between the numbers.
4 and 6

A. 2√6

B. 4√6

C. 0√6

D. 7√6

Correct answer: A

91. Find the geometric mean between the numbers.
½ and 2

A. 3

B. -1

C. 6

D. 1

Correct answer: D

92. Find the geometric mean between the numbers.
4 and 25

A. 8

B. 15

C. 10

D. 12

Correct answer: C

Geometric Mean

93. Find the geometric mean between the numbers.
12 and 20

A. 9√15

B. 4√15

C. 6√15

D. 2√15

Correct answer: B

94. Find the geometric mean between the numbers.
17 and 3

A. √51

B. √53

C. √49

D. √56

Correct answer: A

95. Find the geometric mean between the numbers.
3 and 24

A. 8√2

B. 4√2

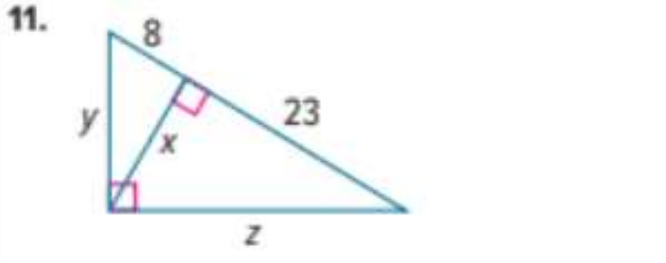
C. 11√2

D. 6√2

Correct answer: D

Geometric Mean

96. Find x, y, and z.



A. x=0√46, y=2√62, z=√713

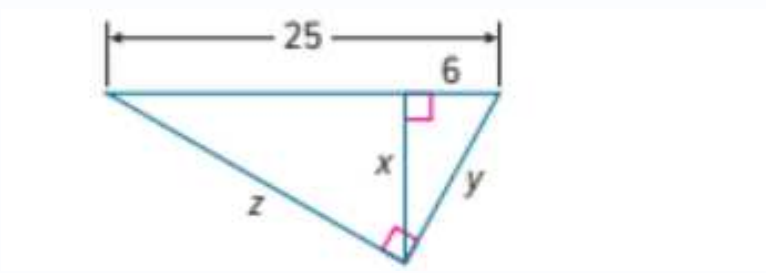
B. x=7√46, y=2√62, z=√713

C. x=2√46, y=2√62, z=√713

D. x=4√46, y=2√62, z=√713

Correct answer: C

97. Find x, y, and z.



A. x=√119, y=5√6, z=5√19

B. x=√114, y=5√6, z=5√19

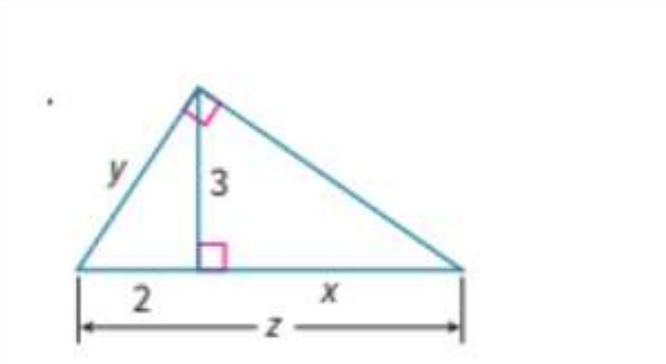
C. x=√116, y=5√6, z=5√19

D. x=√112, y=5√6, z=5√19

Correct answer: B

Geometric Mean

98. Find x, y, and z.



A. x=4.5, y=√13, z=6.5

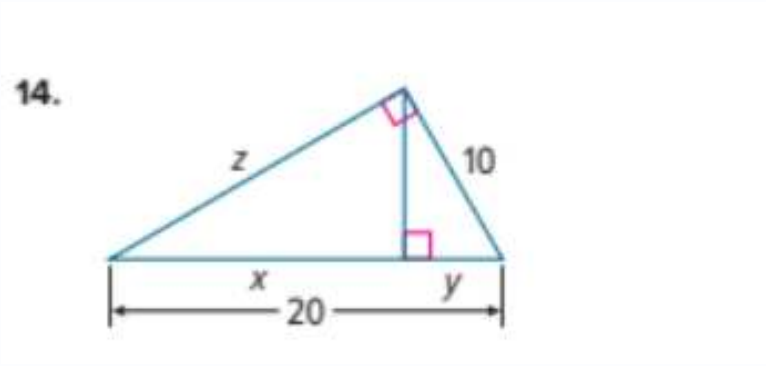
B. x=6.5, y=√13, z=6.5

C. x=2.5, y=√13, z=6.5

D. x=9.5, y=√13, z=6.5

Correct answer: A

99. Find x, y, and z.



A. x=17, y=5, z=10√3

B. x=13, y=5, z=10√3

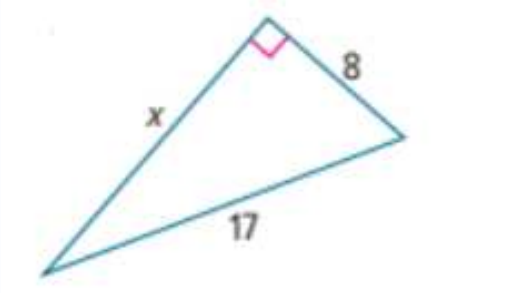
C. x=20, y=5, z=10√3

D. x=15, y=5, z=10√3

Correct answer: D

Pythagorean Theorem

100. Use a Pythagorean triple to find x.



A. 20

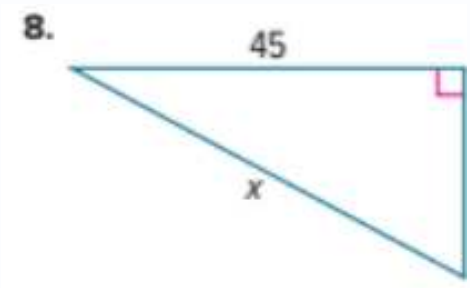
B. 15

C. 17

D. 13

Correct answer: B

101. Use a Pythagorean triple to find x.



A. 51

B. 53

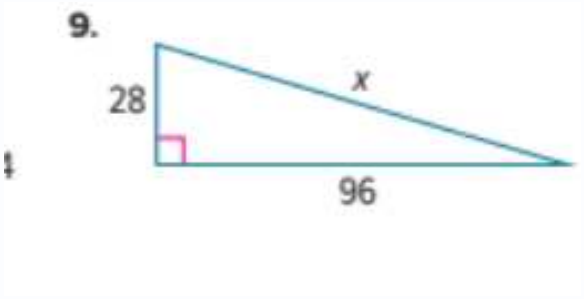
C. 49

D. 56

Correct answer: A

Pythagorean Theorem

102. Use a Pythagorean triple to find x.



A. 102

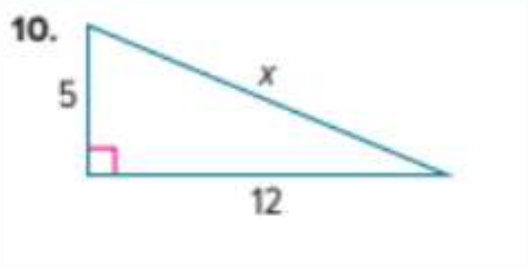
B. 98

C. 105

D. 100

Correct answer: D

103. Use a Pythagorean triple to find x.



A. 11

B. 18

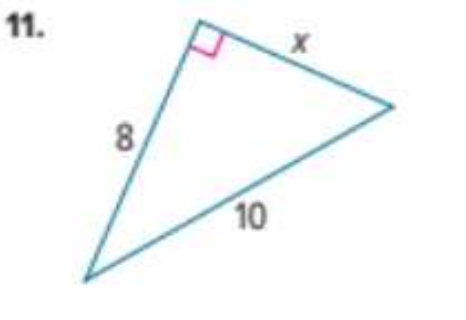
C. 13

D. 15

Correct answer: C

Pythagorean Theorem

104. Use a Pythagorean triple to find x.



A. 11

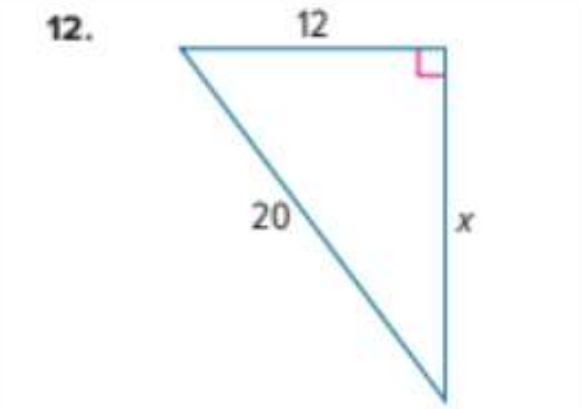
B. 6

C. 8

D. 4

Correct answer: B

105. Use a Pythagorean triple to find x.



A. 16

B. 18

C. 14

D. 21

Correct answer: A

Pythagorean Theorem

106. Can these be the side lengths of a triangle? If so, classify it.
√5, √12, √13

A. Acute triangle

B. Right triangle

C. Obtuse triangle

D. Not a triangle

Correct answer: A

107. Can these be the side lengths of a triangle? If so, classify it.
2, √8, √12

A. Acute triangle

B. Obtuse triangle

C. Not a triangle

D. Right triangle

Correct answer: D

108. Can these be the side lengths of a triangle? If so, classify it.
9, 40, 41

A. Obtuse triangle

B. Not a triangle

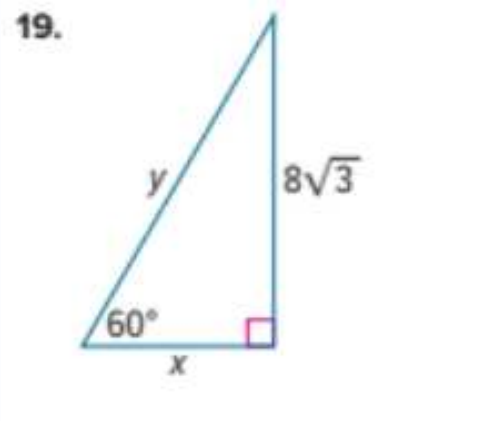
C. Right triangle

D. Acute triangle

Correct answer: C

Special Right Triangles

109. Find x and y.



A. x=8, y=16

B. x=10, y=16

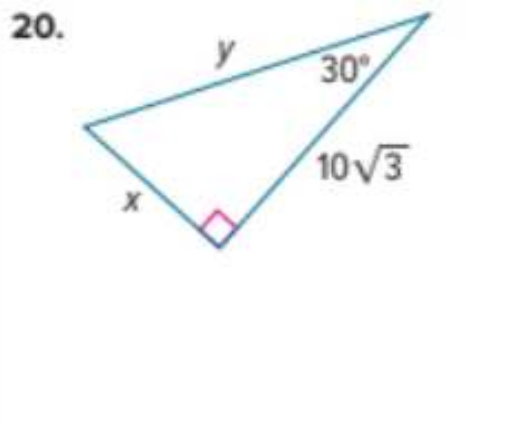
C. x=6, y=16

D. x=13, y=16

Correct answer: A

Special Right Triangles

110. Find x and y.



A. x=12, y=20

B. x=8, y=20

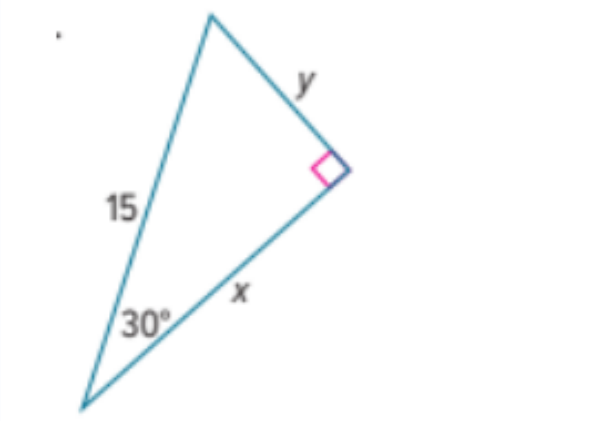
C. x=15, y=20

D. x=10, y=20

Correct answer: D

Special Right Triangles

111. Find x and y.



A. x=13√3/2, y=15/2

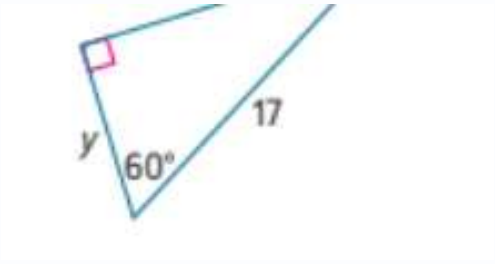
B. x=20√3/2, y=15/2

C. x=15√3/2, y=15/2

D. x=17√3/2, y=15/2

Correct answer: C

112. Find x and y.



A. x=22√3/2, y=17/2

B. x=17√3/2, y=17/2

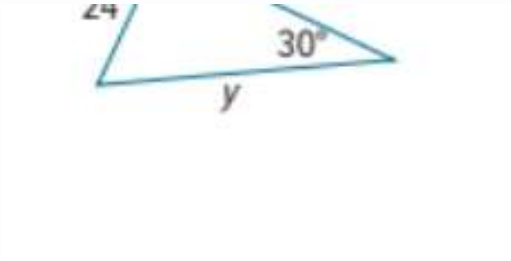
C. x=19√3/2, y=17/2

D. x=15√3/2, y=17/2

Correct answer: B

Special Right Triangles

113. Find x and y.



A. x=24√3, y=48

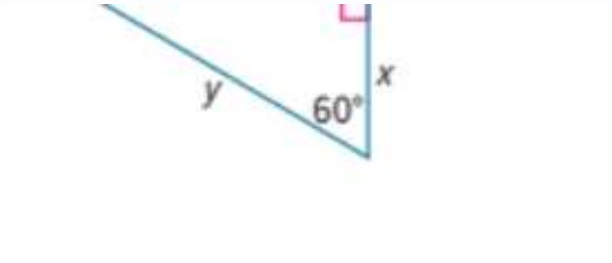
B. x=26√3, y=48

C. x=22√3, y=48

D. x=29√3, y=48

Correct answer: A

114. Find x and y.



A. x=16√3/3, y=28√3/3

B. x=12√3/3, y=28√3/3

C. x=19√3/3, y=28√3/3

D. x=14√3/3, y=28√3/3

Correct answer: D

Special Right Triangles

115. A 40-foot-long escalator rises from the first floor to the second floor of a shopping mall. The escalator makes a 30° angle with the horizontal. How high above the first floor is the second floor?

A. 18 ft

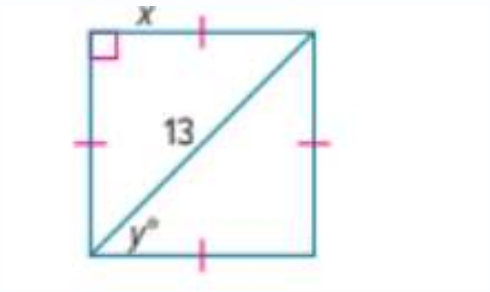
B. 25 ft

C. 20 ft

D. 22 ft

Correct answer: C

116. Find x and y.



A. x=11√2/2, y=45°

B. x=18√2/2, y=45°

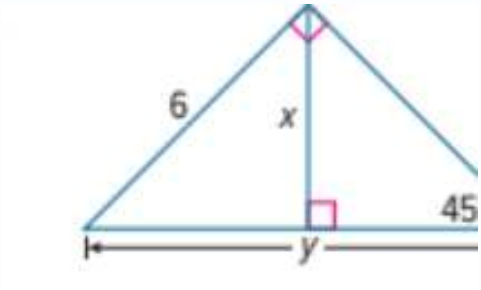
C. x=13√2/2, y=45°

D. x=15√2/2, y=45°

Correct answer: C

Special Right Triangles

117. Find x and y.



A. x=8√2, y=6√2

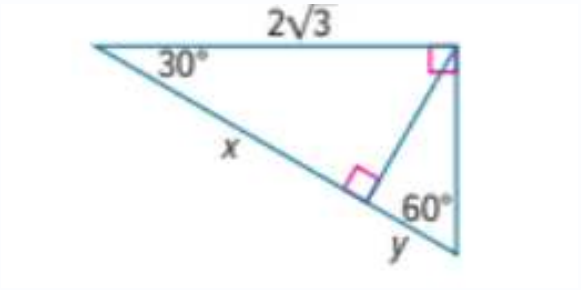
B. x=3√2, y=6√2

C. x=5√2, y=6√2

D. x=1√2, y=6√2

Correct answer: B

118. Find x and y.



A. x=3, y=1

B. x=5, y=1

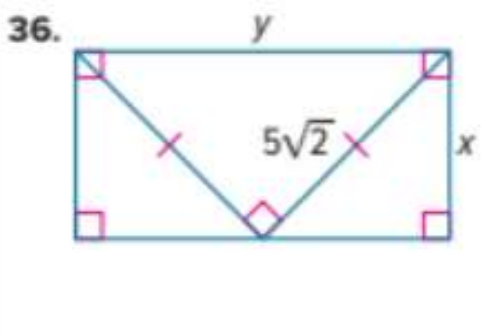
C. x=1, y=1

D. x=8, y=1

Correct answer: A

Special Right Triangles

119. Find x and y.



A. x=7, y=10

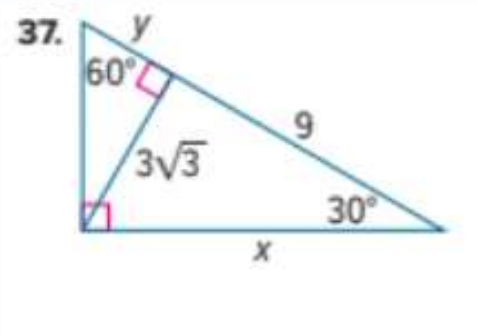
B. x=3, y=10

C. x=10, y=10

D. x=5, y=10

Correct answer: D

120. Find x and y.



A. x=4√3, y=3

B. x=11√3, y=3

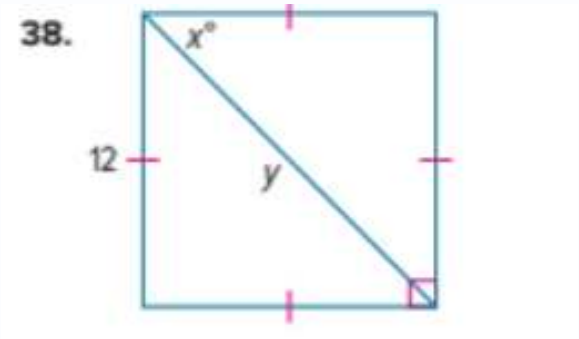
C. x=6√3, y=3

D. x=8√3, y=3

Correct answer: C

Special Right Triangles

121. Find x and y.



A. x=50°, y=12√2

B. x=45°, y=12√2

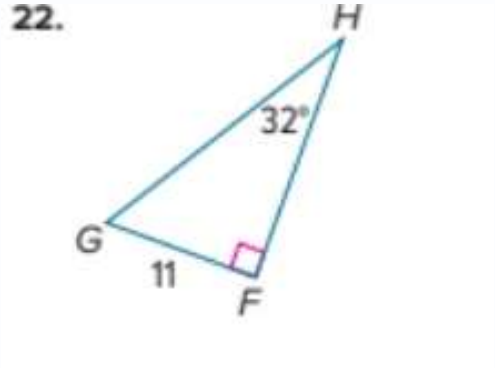
C. x=47°, y=12√2

D. x=43°, y=12√2

Correct answer: B

Trigonometry

122. Solve the right triangle. Round sides to the nearest tenth and angles to the nearest degree.



A. GH=20.8, FH=17.6, ∠G=58°

B. GH=22.8, FH=17.6, ∠G=58°

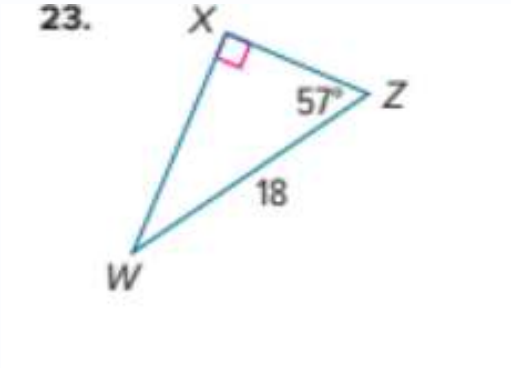
C. GH=18.8, FH=17.6, ∠G=58°

D. GH=25.8, FH=17.6, ∠G=58°

Correct answer: A

Trigonometry

123. Solve the right triangle. Round sides to the nearest tenth and angles to the nearest degree.



A. WX=17.1, XZ=9.8, ∠W=33°

B. WX=13.1, XZ=9.8, ∠W=33°

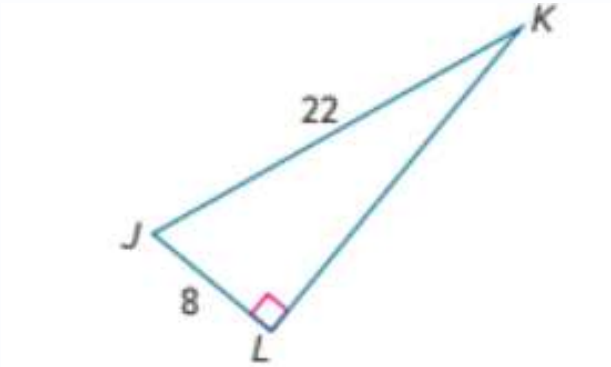
C. WX=20.1, XZ=9.8, ∠W=33°

D. WX=15.1, XZ=9.8, ∠W=33°

Correct answer: D

Trigonometry

124. Solve the right triangle. Round sides to the nearest tenth and angles to the nearest degree.



A. KL=18.5, ∠J=69°, ∠K=21°

B. KL=25.5, ∠J=69°, ∠K=21°

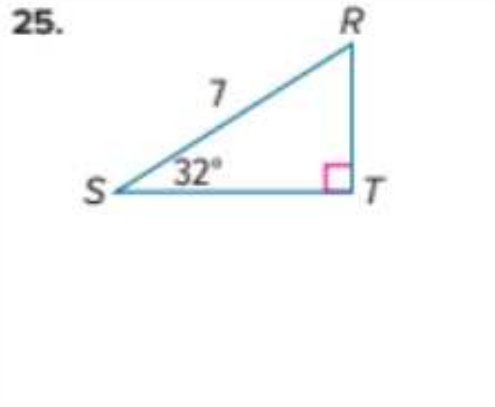
C. KL=20.5, ∠J=69°, ∠K=21°

D. KL=22.5, ∠J=69°, ∠K=21°

Correct answer: C

Trigonometry

125. Solve the right triangle. Round sides to the nearest tenth and angles to the nearest degree.



A. ST=10.9, RT=3.7, ∠R=58°

B. ST=5.9, RT=3.7, ∠R=58°

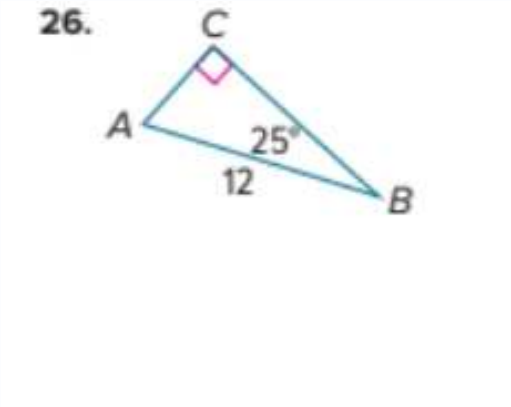
C. ST=7.9, RT=3.7, ∠R=58°

D. ST=3.9, RT=3.7, ∠R=58°

Correct answer: B

Trigonometry

126. Solve the right triangle. Round sides to the nearest tenth and angles to the nearest degree.



A. AC=5.1, BC=10.9, ∠A=65°

B. AC=7.1, BC=10.9, ∠A=65°

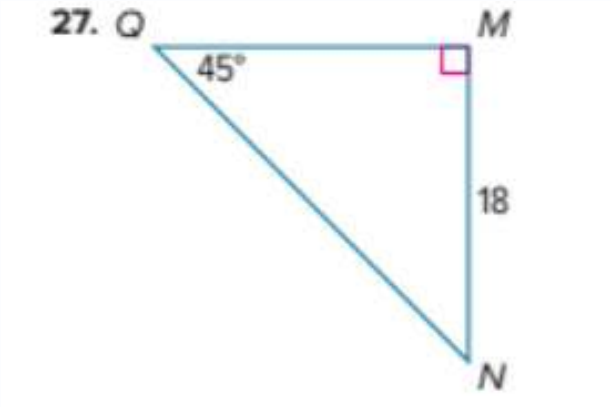
C. AC=3.1, BC=10.9, ∠A=65°

D. AC=10.1, BC=10.9, ∠A=65°

Correct answer: A

Trigonometry

127. Solve the right triangle. Round sides to the nearest tenth and angles to the nearest degree.



A. QM=20, QN=25.5, ∠N=45°

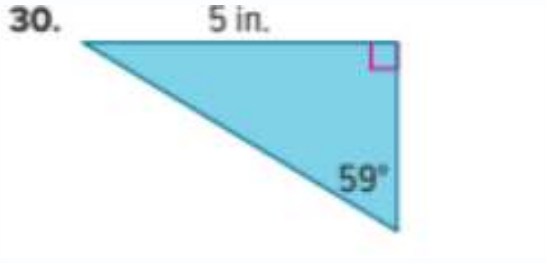
B. QM=16, QN=25.5, ∠N=45°

C. QM=23, QN=25.5, ∠N=45°

D. QM=18.0, QN=25.5, ∠N=45°

Correct answer: D

128. Find the perimeter and area. Round to the nearest hundredth.



A. P=13.84 in.; A=7.51 in.²

B. P=15.84 in.; A=7.51 in.²

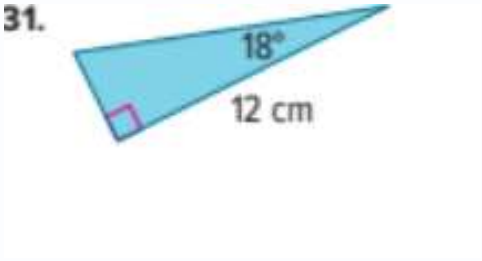
C. P=11.84 in.; A=7.51 in.²

D. P=18.84 in.; A=7.51 in.²

Correct answer: A

Trigonometry

129. Find the perimeter and area. Round to the nearest hundredth.



A. P=30.52 cm; A=23.39 cm²

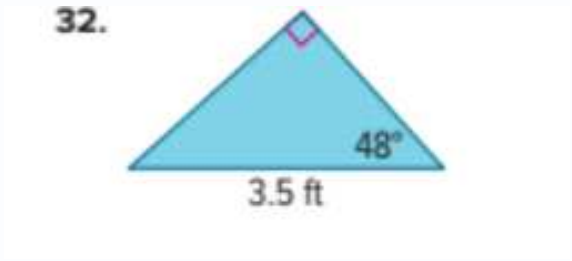
B. P=26.52 cm; A=23.39 cm²

C. P=33.52 cm; A=23.39 cm²

D. P=28.52 cm; A=23.39 cm²

Correct answer: D

130. Find the perimeter and area. Round to the nearest hundredth.



A. P=6.44 ft; A=3.05 ft²

B. P=13.44 ft; A=3.05 ft²

C. P=8.44 ft; A=3.05 ft²

D. P=10.44 ft; A=3.05 ft²

Correct answer: C

Applying Trigonometry

131. Sailors on a ship at sea spot the light from a lighthouse at an angle of elevation of 25°. The light of the lighthouse is 30 meters above sea level. How far from the shore is the ship? Round your answer to the nearest meter.

A. 64 m

B. 66 m

C. 62 m

D. 69 m

Correct answer: A

132. A student can see a water tower from the edge of a soccer field at San Lobos High School. The edge of the field is about 110 feet from the water tower, and the water tower stands at a height of 32.5 feet. What is the angle of elevation if the eye level of the student viewing the tower is 6 feet above the ground? Round your answer to the nearest tenth.

A. 15.5°

B. 11.5°

C. 18.5°

D. 13.5°

Correct answer: D

Applying Trigonometry

133. A roofer props a ladder against a wall so the top of the ladder just reaches a 30-foot roof that needs repair. If the angle of elevation from the bottom of the ladder to the roof is 55°, how far is the ladder from the base of the wall? Round your answer to the nearest foot.

A. 19 ft

B. 26 ft

C. 21 ft

D. 23 ft

Correct answer: C

134. On a mountain bike trip along the Gemini Bridges Trail in Moab, Utah, Nabuko stopped on the canyon floor to get a good view of the twin sandstone bridges. Nabuko is standing about 60 meters from the base of the canyon cliff, and the natural arch bridges are about 100 meters up the canyon wall. If her line of sight is 5 meters above the ground, what is the angle of elevation to the top of the bridges? Round your answer to the nearest tenth of a degree.

A. 62.7°

B. 57.7°

C. 59.7°

D. 55.7°

Correct answer: B

Applying Trigonometry

135. Lucia is 5.5 feet tall. She is standing on the roof of a building that is 80 feet tall. She spots a fountain at ground level that she knows to be 122 feet away from the base of the building. What is the measure of the angle of depression formed by Lucia's horizontal line of sight and her line of sight to the fountain? Round your answer to the nearest degree.

A. 35°

B. 37°

C. 33°

D. 40°

Correct answer: A

136. From the top of the 120-foot-high tower, an air traffic controller observes an airplane on the runway at an angle of depression of 19°. How far from the base of the tower is the airplane? Round to the nearest tenth of a foot.

A. 350.5 ft

B. 346.5 ft

C. 353.5 ft

D. 348.5 ft

Correct answer: D

Applying Trigonometry

137. Due to a storm, a pilot flying at an altitude of 528 feet has to land. If he has a horizontal distance of 2000 feet until he reaches the landing strip, what angle of depression should he use to land? Round to the nearest tenth of a degree.

A. 12.8°

B. 19.8°

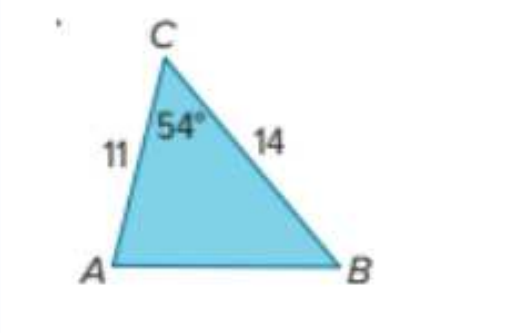
C. 14.8°

D. 16.8°

Correct answer: C

Triangle Area

138. Find the area of △ABC to the nearest tenth.



A. 64.3 units²

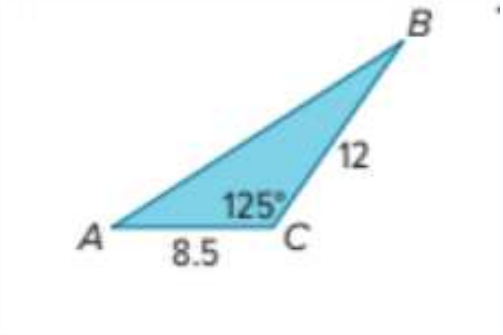
B. 60.3 units²

C. 67.3 units²

D. 62.3 units²

Correct answer: D

139. Find the area of △ABC to the nearest tenth.



A. 39.8 units²

B. 46.8 units²

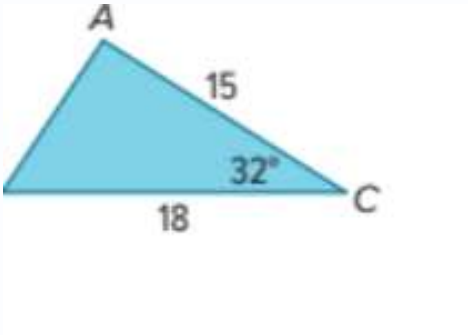
C. 41.8 units²

D. 43.8 units²

Correct answer: C

Triangle Area

140. Find the area of △ABC to the nearest tenth.



A. 76.5 units²

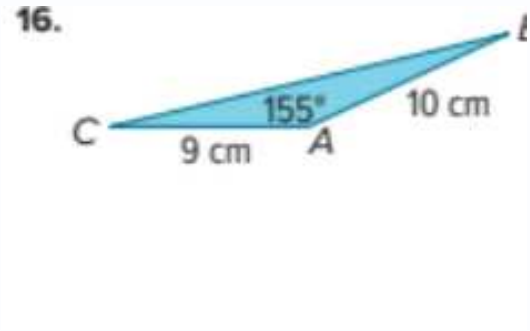
B. 71.5 units²

C. 73.5 units²

D. 69.5 units²

Correct answer: B

141. Find the area of △ABC to the nearest tenth.



A. 19.0 cm²

B. 21 cm²

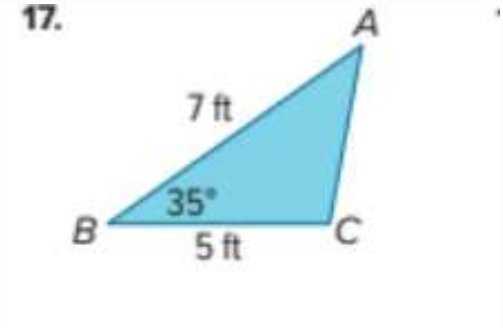
C. 17 cm²

D. 24 cm²

Correct answer: A

Triangle Area

142. Find the area of △ABC to the nearest tenth.



A. 12 ft²

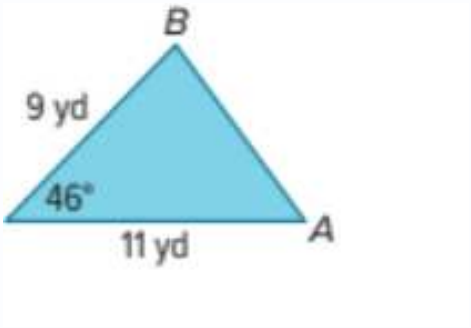
B. 8 ft²

C. 15 ft²

D. 10.0 ft²

Correct answer: D

143. Find the area of △ABC to the nearest tenth.



A. 33.6 yd²

B. 40.6 yd²

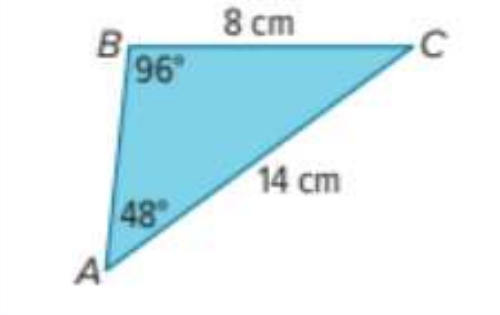
C. 35.6 yd²

D. 37.6 yd²

Correct answer: C

Triangle Area

144. Find the area of △ABC to the nearest tenth.



A. 37.9 cm²

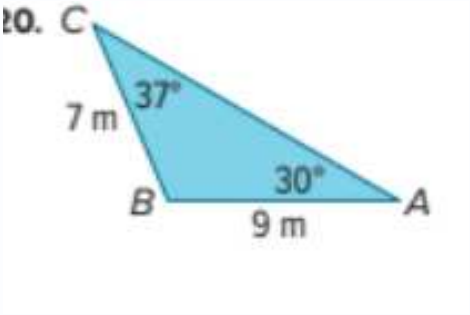
B. 32.9 cm²

C. 34.9 cm²

D. 30.9 cm²

Correct answer: B

145. Find the area of △ABC to the nearest tenth.



A. 29.0 m²

B. 31 m²

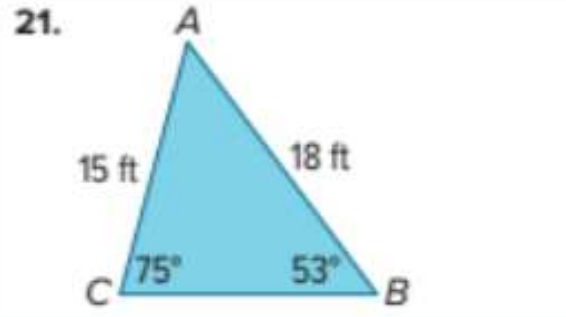
C. 27 m²

D. 34 m²

Correct answer: A

Triangle Area

146. Find the area of △ABC to the nearest tenth.



A. 108.4 ft²

B. 104.4 ft²

C. 111.4 ft²

D. 106.4 ft²

Correct answer: D

Factoring Special Products

147. Factor completely, if possible. If it cannot be factored using integers, write prime.
$8x^2 - 72p^2$

Solution
$8x^2 - 72p^2 = 8(x^2 - 9p^2)$
Use $a^2 - b^2 = (a - b)(a + b)$.
$8(x - 3p)(x + 3p)$

148. Factor completely, if possible. If it cannot be factored using integers, write prime.
$20q^2 - 5r^2$

Solution
$20q^2 - 5r^2 = 5(4q^2 - r^2)$
Use the difference of two squares.
$5(2q - r)(2q + r)$

149. Factor completely, if possible. If it cannot be factored using integers, write prime.
$32a^2 - 50b^2$

Solution
$32a^2 - 50b^2 = 2(16a^2 - 25b^2)$
Use the difference of two squares.
$2(4a - 5b)(4a + 5b)$

Factoring Special Products

150. Factor completely, if possible. If it cannot be factored using integers, write prime.
$16b^2 - 100$

Solution
$16b^2 - 100 = 4(4b^2 - 25)$
Use the difference of two squares.
$4(2b - 5)(2b + 5)$

151. Factor completely, if possible. If it cannot be factored using integers, write prime.
$49x^2 - 64y^2$

Solution
$49x^2 - 64y^2 = (7x)^2 - (8y)^2$
$(7x - 8y)(7x + 8y)$

152. Factor completely, if possible. If it cannot be factored using integers, write prime.
$3n^4 - 42n^3 + 147n^2$

Solution
$3n^4 - 42n^3 + 147n^2 = 3n^2(n^2 - 14n + 49)$
$n^2 - 14n + 49 = n^2 - 2(n)(7) + 7^2$
$3n^2(n - 7)^2$

Factoring Special Products

153. Factor completely, if possible. If it cannot be factored using integers, write prime.
$8m^3 - 24m^2 + 18m$

Solution
$8m^3 - 24m^2 + 18m = 2m(4m^2 - 12m + 9)$
$4m^2 - 12m + 9 = (2m)^2 - 2(2m)(3) + 3^2$
$2m(2m - 3)^2$

154. Is this a perfect square trinomial? Write yes or no. If yes, factor it.
$9z^2 - 6z + 1$

Solution
$9z^2 = (3z)^2$ and $1 = 1^2$.
The middle term is $-2(3z)(1) = -6z$.
Yes; $(3z - 1)^2$.

155. Is this a perfect square trinomial? Write yes or no. If yes, factor it.
$36x^2 - 60x + 25$

Solution
$36x^2 = (6x)^2$ and $25 = 5^2$.
The middle term is $-2(6x)(5) = -60x$.
Yes; $(6x - 5)^2$.

Factoring Special Products

156. Is this a perfect square trinomial? Write yes or no. If yes, factor it.
$49r^2 + 14r + 4$

Solution
The first and last terms are $(7r)^2$ and 2^2.
A perfect square would have middle term $\pm 2(7r)(2) = \pm 28r$, not $14r$.
No; it is not a perfect square trinomial.

157. Is this a perfect square trinomial? Write yes or no. If yes, factor it.
$a^2 + 14a + 49$

Solution
$a^2 + 14a + 49 = a^2 + 2(a)(7) + 7^2$
Yes; $(a + 7)^2$.

158. Is this a perfect square trinomial? Write yes or no. If yes, factor it.
$t^2 - 18t + 81$

Solution
$t^2 - 18t + 81 = t^2 - 2(t)(9) + 9^2$
Yes; $(t - 9)^2$.

159. Is this a perfect square trinomial? Write yes or no. If yes, factor it.
$4c^2 + 2cd + d^2$

Solution
The first and last terms are $(2c)^2$ and d^2.
The required middle term is $2(2c)(d) = 4cd$, not $2cd$.
No; it is not a perfect square trinomial.

Polygon Angles

160. The measure of an interior angle of a regular polygon is given. Find the number of sides.
144°

Solution
For a regular n-sided polygon, each exterior angle is 180° - the interior angle.
Exterior angle = 180° - 144° = 36°.
n = 360° / 36° = 10 sides.

161. The measure of an interior angle of a regular polygon is given. Find the number of sides.
156°

Solution
For a regular n-sided polygon, each exterior angle is 180° - the interior angle.
Exterior angle = 180° - 156° = 24°.
n = 360° / 24° = 15 sides.

162. The measure of an interior angle of a regular polygon is given. Find the number of sides.
160°

Solution
For a regular n-sided polygon, each exterior angle is 180° - the interior angle.
Exterior angle = 180° - 160° = 20°.
n = 360° / 20° = 18 sides.

Polygon Angles

163. The measure of an interior angle of a regular polygon is given. Find the number of sides.
108°

Solution
For a regular n-sided polygon, each exterior angle is 180° - the interior angle.
Exterior angle = 180° - 108° = 72°.
n = 360° / 72° = 5 sides.

164. The measure of an interior angle of a regular polygon is given. Find the number of sides.
120°

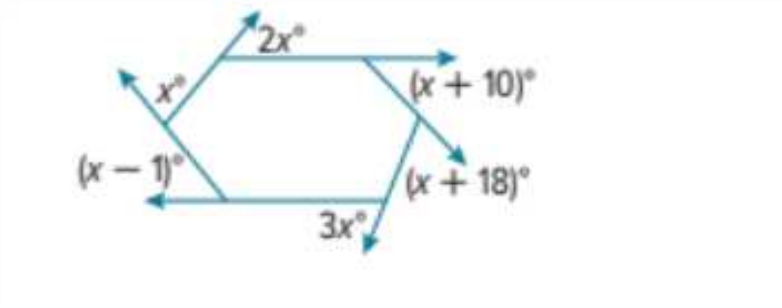
Solution
For a regular n-sided polygon, each exterior angle is 180° - the interior angle.
Exterior angle = 180° - 120° = 60°.
n = 360° / 60° = 6 sides.

165. The measure of an interior angle of a regular polygon is given. Find the number of sides.
150°

Solution
For a regular n-sided polygon, each exterior angle is 180° - the interior angle.
Exterior angle = 180° - 150° = 30°.
n = 360° / 30° = 12 sides.

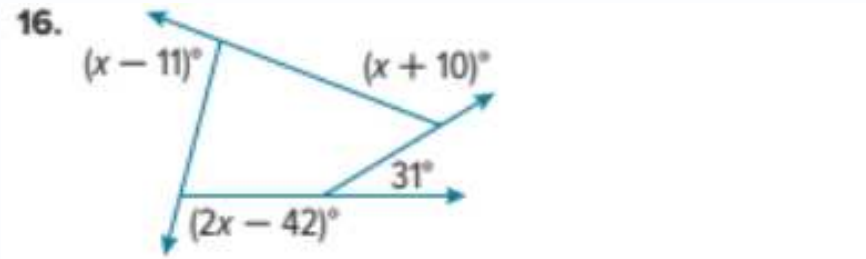
Polygon Angles

166. Find x in the diagram.



Solution
The sum of the exterior angles is 360°.
x + 2x + (x + 10) + (x + 18) + 3x + (x - 1) = 360
9x + 27 = 360; 9x = 333
x = 37

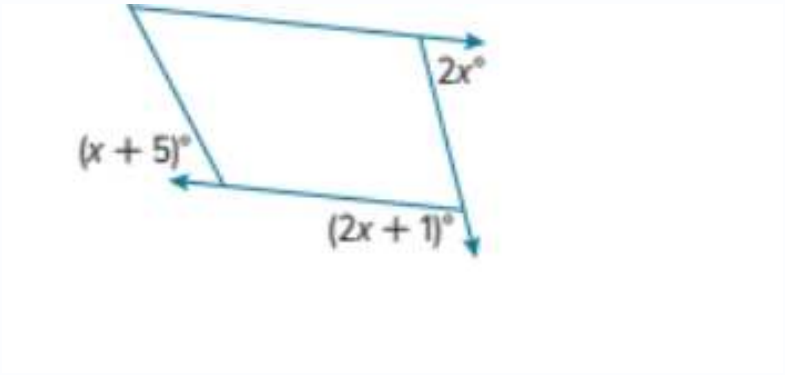
167. Find x in the diagram.



Solution
(x - 11) + (x + 10) + 31 + (2x - 42) = 360
4x - 12 = 360; 4x = 372
x = 93

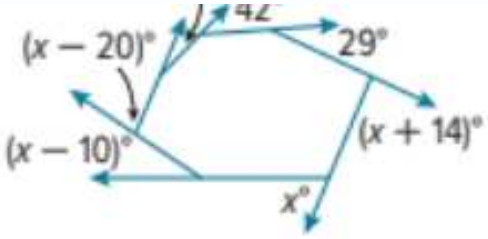
Polygon Angles

168. Find x in the diagram.



Solution
(3x + 2) + 2x + (2x + 1) + (x + 5) = 360
8x + 8 = 360; 8x = 352
x = 44

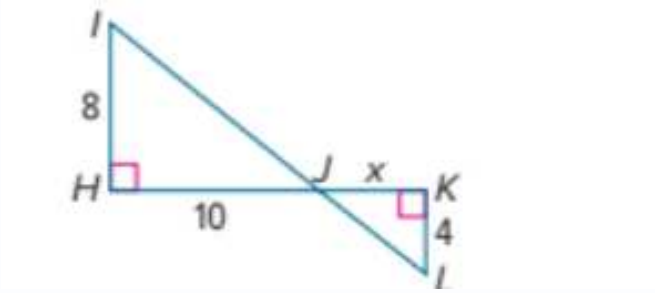
169. Find x in the diagram.



Solution
(x - 20) + (x - 10) + 21 + 42 + 29 + (x + 14) + x = 360
4x + 76 = 360; 4x = 284
x = 71

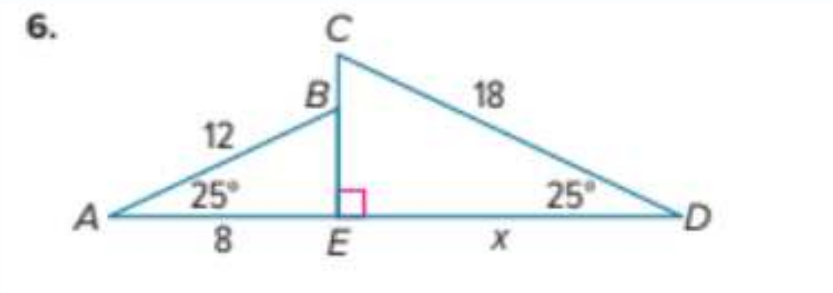
Solving Similar Triangles

170. Identify the similar triangles. Then find x.



Solution
△IHJ ~ △LKJ by AA: both have a right angle, and their angles at J are vertical angles.
IH / LK = HJ / KJ
8/4 = 10/x; 8x = 40
x = 5

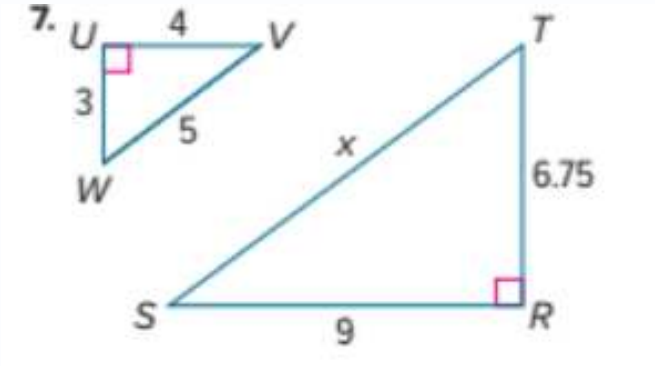
171. Identify the similar triangles. Then find x.



Solution
△ABE ~ △DCE by AA: ∠A = ∠D = 25° and both angles at E are right angles.
AB / DC = AE / DE
12/18 = 8/x; 12x = 144
x = 12

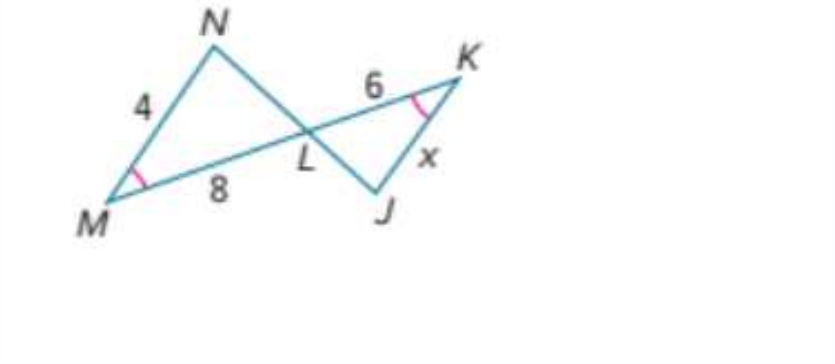
Solving Similar Triangles

172. Identify the similar triangles. Then find x.



Solution
△UVW ~ △RST by SAS: UV/RS = 4/9 and UW/RT = 3/6.75 = 4/9; the included angles are right angles.
VW / ST = UV / RS
5/x = 4/9; 4x = 45
x = 11.25

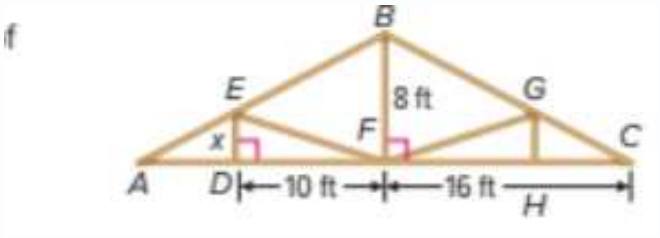
173. Identify the similar triangles. Then find x.



Solution
△MNL ~ △KJL by AA: the marked angles at M and K match, and the angles at L are vertical angles.
MN / KJ = ML / KL
4/x = 8/6; 8x = 24
x = 3

Solving Similar Triangles

174. The skeleton of a roof is shown. Find x such that triangles DEF and FBC in the outline of the roof are similar.



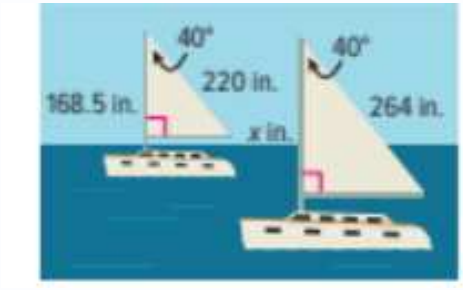
Solution
Use the given correspondence △DEF ~ △FBC.
DE / FB = DF / FC
x/8 = 10/16; 16x = 80
x = 5 ft

175. A radio tower casts an 8-foot-long shadow at the same time that a vertical yardstick casts a shadow one half inch long. If the triangles formed by the objects and their shadows are similar, how tall is the radio tower?

Solution
A yardstick is 3 feet tall. Convert its shadow to feet: ½ inch = 1/24 foot.
By similarity, tower height / 8 = 3 / (1/24).
Tower height = 8 × 3 × 24
576 feet

Solving Similar Triangles

176. The two sailboats shown are participating in a regatta. If the sails are similar, what is x?



Solution
The sails are similar. The scale factor from the smaller sail to the larger sail is 264/220 = 1.2.
x / 168.5 = 264 / 220
x = 168.5 × 1.2
x = 202.2 inches

Coordinates in Space

177. Find the coordinates of the midpoint M of the segment joining the points. K(-2, -4, -4) and L(4, 2, 0)

Solution
$M = ((x_1 + x_2)/2, (y_1 + y_2)/2, (z_1 + z_2)/2)$
$M = ((-2 + (4))/2, (-4 + (2))/2, (-4 + (0))/2)$
$M = (1, -1, -2)$

178. Find the coordinates of the midpoint M of the segment joining the points. W(-1, -3, -6) and Z(-1, 5, 10)

Solution
$M = ((x_1 + x_2)/2, (y_1 + y_2)/2, (z_1 + z_2)/2)$
$M = ((-1 + (-1))/2, (-3 + (5))/2, (-6 + (10))/2)$
$M = (-1, 1, 2)$

179. Find the coordinates of the midpoint M of the segment joining the points. R(3, 3, 4) and V(5, 4, 13)

Solution
$M = ((x_1 + x_2)/2, (y_1 + y_2)/2, (z_1 + z_2)/2)$
$M = ((3 + (5))/2, (3 + (4))/2, (4 + (13))/2)$
$M = (4, 7/2, 17/2)$

Coordinates in Space

180. Find the coordinates of the midpoint M of the segment joining the points. A(4, 6, -8) and B(0, 0, 0)

Solution
$M = ((x_1 + x_2)/2, (y_1 + y_2)/2, (z_1 + z_2)/2)$
$M = ((4 + (0))/2, (6 + (0))/2, (-8 + (0))/2)$
$M = (2, 3, -4)$

181. Find the coordinates of the midpoint M of the segment joining the points. C(8, 7, 11) and D(2, 1, 8)

Solution
$M = ((x_1 + x_2)/2, (y_1 + y_2)/2, (z_1 + z_2)/2)$
$M = ((8 + (2))/2, (7 + (1))/2, (11 + (8))/2)$
$M = (5, 4, 19/2)$

182. Find the coordinates of the midpoint M of the segment joining the points. T(-1, -7, 9) and U(5, -1, -6)

Solution
$M = ((x_1 + x_2)/2, (y_1 + y_2)/2, (z_1 + z_2)/2)$
$M = ((-1 + (5))/2, (-7 + (-1))/2, (9 + (-6))/2)$
$M = (2, -4, 3/2)$

Coordinates in Space

183. Find the distance between the points and the coordinates of their midpoint M.
P(-5, -2, -1) and Q(-1, 0, 3)

Solution
$d = \sqrt{[(x_2 - x_1)^2 + (y_2 - y_1)^2 + (z_2 - z_1)^2]}$
Coordinate differences: (4, 2, 4).
$d^2 = 16 + 4 + 16 = 36$
$d = 6$
Average the corresponding coordinates to find the midpoint.
M = (-3, -1, 1)

184. Find the distance between the points and the coordinates of their midpoint M.
J(1, 1, 1) and K(-1, -1, -1)

Solution
$d = \sqrt{[(x_2 - x_1)^2 + (y_2 - y_1)^2 + (z_2 - z_1)^2]}$
Coordinate differences: (-2, -2, -2).
$d^2 = 4 + 4 + 4 = 12$
$d = 2\sqrt{3}$
Average the corresponding coordinates to find the midpoint.
M = (0, 0, 0)

Coordinates in Space

185. Find the distance between the points and the coordinates of their midpoint M. F(3/5, 0, 4/5) and G(0, 3, 0)

Solution
$d = \sqrt{[(x_2 - x_1)^2 + (y_2 - y_1)^2 + (z_2 - z_1)^2]}$
Coordinate differences: (-3/5, 3, -4/5).
$d^2 = 9/25 + 9 + 16/25 = 10$
$d = \sqrt{10}$
Average the corresponding coordinates to find the midpoint.
M = (3/10, 3/2, 2/5)

186. Find the distance between the points and the coordinates of their midpoint M. G(1, -1, 6) and H(1/5, -2/5, 2)

Solution
$d = \sqrt{[(x_2 - x_1)^2 + (y_2 - y_1)^2 + (z_2 - z_1)^2]}$
Coordinate differences: (-4/5, 3/5, -4).
$d^2 = 16/25 + 9/25 + 16 = 17$
$d = \sqrt{17}$
Average the corresponding coordinates to find the midpoint.
M = (3/5, -7/10, 4)

Coordinates in Space

187. Find the distance between the points and the coordinates of their midpoint M.
B(√3, 2, 2√2) and C(-2√3, 4, 4√2)

Solution
$d = \sqrt{[(x_2 - x_1)^2 + (y_2 - y_1)^2 + (z_2 - z_1)^2]}$
Coordinate differences: (-3√3, 2, 2√2).
$d^2 = 27 + 4 + 8 = 39$
$d = \sqrt{39}$
Average the corresponding coordinates to find the midpoint.
M = (-√3/2, 3, 3√2)

188. Find the distance between the points and the coordinates of their midpoint M.
S(6√3, 4, 4√2) and T(4√3, 5, √2)

Solution
$d = \sqrt{[(x_2 - x_1)^2 + (y_2 - y_1)^2 + (z_2 - z_1)^2]}$
Coordinate differences: (-2√3, 1, -3√2).
$d^2 = 12 + 1 + 18 = 31$
$d = \sqrt{31}$
Average the corresponding coordinates to find the midpoint.
M = (5√3, 9/2, 5√2/2)

Law of Sines

189. Determine whether the triangle has no solution, one solution, or two solutions. Then solve the triangle. Round sides to the nearest tenth and angles to the nearest degree.
∠A = 50°, a = 34, b = 40

Solution
By the Law of Sines, sin B / b = sin A / a.
sin B = (40 sin 50°)/34 ≈ 0.90123.
Two solutions (2 triangles).
Triangle 1: B ≈ 64.320°, C = 180° - 50° - B ≈ 65.680°.
c = 34 sin C / sin 50° ≈ 40.4452.
B ≈ 64°, C ≈ 66°, c ≈ 40.4.
Triangle 2: B ≈ 115.680°, C = 180° - 50° - B ≈ 14.320°.
c = 34 sin C / sin 50° ≈ 10.9778.
B ≈ 116°, C ≈ 14°, c ≈ 11.0.

190. Determine whether the triangle has no solution, one solution, or two solutions. Then solve the triangle. Round sides to the nearest tenth and angles to the nearest degree.
∠A = 24°, a = 3, b = 8

Solution
By the Law of Sines, sin B / b = sin A / a.
sin B = (8 sin 24°)/3 ≈ 1.08463.
Since sin B cannot exceed 1, no triangle is possible.
No solution (0 triangles).

Law of Sines

191. Determine whether the triangle has no solution, one solution, or two solutions. Then solve the triangle. Round sides to the nearest tenth and angles to the nearest degree.
∠A = 125°, a = 22, b = 15

Solution
By the Law of Sines, sin B / b = sin A / a.
sin B = (15 sin 125°)/22 ≈ 0.55851.
One solution (1 triangle).
Triangle 1: B ≈ 33.953°, C = 180° - 125° - B ≈ 21.047°.
c = 22 sin C / sin 125° ≈ 9.6453.
B ≈ 34°, C ≈ 21°, c ≈ 9.6.
The supplementary value of B makes A + B ≥ 180°, so it is rejected.

192. Determine whether the triangle has no solution, one solution, or two solutions. Then solve the triangle. Round sides to the nearest tenth and angles to the nearest degree.
∠A = 30°, a = 1, b = 4

Solution
By the Law of Sines, sin B / b = sin A / a.
sin B = (4 sin 30°)/1 ≈ 2.00000.
Since sin B cannot exceed 1, no triangle is possible.
No solution (0 triangles).

Law of Sines

193. Determine whether the triangle has no solution, one solution, or two solutions. Then solve the triangle. Round sides to the nearest tenth and angles to the nearest degree.
∠A = 30°, a = 2, b = 4

Solution
By the Law of Sines, sin B / b = sin A / a.
sin B = (4 sin 30°)/2 ≈ 1.00000.
One solution (1 triangle).
Triangle 1: B ≈ 90.000°, C = 180° - 30° - B ≈ 60.000°.
c = 2 sin C / sin 30° ≈ 3.4641.
B ≈ 90°, C ≈ 60°, c ≈ 3.5.

194. Determine whether the triangle has no solution, one solution, or two solutions. Then solve the triangle. Round sides to the nearest tenth and angles to the nearest degree.
∠A = 30°, a = 3, b = 4

Solution
By the Law of Sines, sin B / b = sin A / a.
sin B = (4 sin 30°)/3 ≈ 0.66667.
Two solutions (2 triangles).
Triangle 1: B ≈ 41.810°, C = 180° - 30° - B ≈ 108.190°.
c = 3 sin C / sin 30° ≈ 5.7002.
B ≈ 42°, C ≈ 108°, c ≈ 5.7.
Triangle 2: B ≈ 138.190°, C = 180° - 30° - B ≈ 11.810°.
c = 3 sin C / sin 30° ≈ 1.2280.
B ≈ 138°, C ≈ 12°, c ≈ 1.2.

Law of Sines

195. Determine whether the triangle has no solution, one solution, or two solutions. Then solve the triangle. Round sides to the nearest tenth and angles to the nearest degree.
∠A = 38°, a = 10, b = 9

Solution
By the Law of Sines, sin B / b = sin A / a.
sin B = (9 sin 38°)/10 ≈ 0.55410.
One solution (1 triangle).
Triangle 1: B ≈ 33.648°, C = 180° - 38° - B ≈ 108.352°.
c = 10 sin C / sin 38° ≈ 15.4166.
B ≈ 34°, C ≈ 108°, c ≈ 15.4.
The supplementary value of B makes A + B ≥ 180°, so it is rejected.

196. Determine whether the triangle has no solution, one solution, or two solutions. Then solve the triangle. Round sides to the nearest tenth and angles to the nearest degree.
∠A = 78°, a = 8, b = 5

Solution
By the Law of Sines, sin B / b = sin A / a.
sin B = (5 sin 78°)/8 ≈ 0.61134.
One solution (1 triangle).
Triangle 1: B ≈ 37.687°, C = 180° - 78° - B ≈ 64.313°.
c = 8 sin C / sin 78° ≈ 7.3705.
B ≈ 38°, C ≈ 64°, c ≈ 7.4.
The supplementary value of B makes A + B ≥ 180°, so it is rejected.

Law of Sines

197. Determine whether the triangle has no solution, one solution, or two solutions. Then solve the triangle. Round sides to the nearest tenth and angles to the nearest degree.
∠A = 133°, a = 9, b = 7

Solution
By the Law of Sines, sin B / b = sin A / a.
sin B = (7 sin 133°)/9 ≈ 0.56883.
One solution (1 triangle).
Triangle 1: B ≈ 34.669°, C = 180° - 133° - B ≈ 12.331°.
c = 9 sin C / sin 133° ≈ 2.6281.
B ≈ 35°, C ≈ 12°, c ≈ 2.6.
The supplementary value of B makes A + B ≥ 180°, so it is rejected.

198. Determine whether the triangle has no solution, one solution, or two solutions. Then solve the triangle. Round sides to the nearest tenth and angles to the nearest degree.
∠A = 127°, a = 2, b = 6

Solution
By the Law of Sines, sin B / b = sin A / a.
sin B = (6 sin 127°)/2 ≈ 2.39591.
Since sin B cannot exceed 1, no triangle is possible.
No solution (0 triangles).

Law of Sines

199. Determine whether the triangle has no solution, one solution, or two solutions. Then solve the triangle. Round sides to the nearest tenth and angles to the nearest degree.
∠A = 109°, a = 24, b = 13

Solution
By the Law of Sines, sin B / b = sin A / a.
sin B = (13 sin 109°)/24 ≈ 0.51216.
One solution (1 triangle).
Triangle 1: B ≈ 30.808°, C = 180° - 109° - B ≈ 40.192°.
c = 24 sin C / sin 109° ≈ 16.3810.
B ≈ 31°, C ≈ 40°, c ≈ 16.4.
The supplementary value of B makes A + B ≥ 180°, so it is rejected.

200. Determine whether the triangle has no solution, one solution, or two solutions. Then solve the triangle. Round sides to the nearest tenth and angles to the nearest degree.
∠A = 48°, a = 11, b = 16

Solution
By the Law of Sines, sin B / b = sin A / a.
sin B = (16 sin 48°)/11 ≈ 1.08094.
Since sin B cannot exceed 1, no triangle is possible.
No solution (0 triangles).