حل أسئلة متعددة الخيارات حول كثيرات الحدود (محلول)

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MINISTRY OF EDUCATION

هيكل الرياضيات ريفيل الصف العاشر متقدم لعام 2027-2026

اِحجِزْ مَكانَكَ وَاستَعِدَّ لِلْامتِحَانِ بِثِقَةٍ كَامِلَةٍ

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انضم للقناة

Mr. Aghead

MR. AGHEAD 0566991363

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معنا قم بمسح الـ QR

Polynomials, Adding and Subtracting Polynomials, Q1: Write polynomials in standard form. Add and subtract polynomials, Page(635), Exercises(10-14, 22-26)

Multiple Choice Questions - MCQ

Write each polynomial in standard form. Identify the leading coefficient.

10. $-y^3 + 3y - 3y^2 + 2$

A) $-y^3 - 3y^2 + 3y + 2$; Leading coefficient: -1

B) $y^3 + 3y^2 - 3y + 2$; Leading coefficient: 1

C) $-3y^2 - y^3 + 3y + 2$; Leading coefficient: -3

D) $2 + 3y - 3y^2 - y^3$; Leading coefficient: 2

11. $11t + 2t^2 - 3 + t^5$

A) $2t^2 + t^5 + 11t - 3$; Leading coefficient: 2

B) $t^5 + 2t^2 + 11t - 3$; Leading coefficient: 1

C) $t^5 + 11t + 2t^2 - 3$; Leading coefficient: 11

D) $-3 + 11t + 2t^2 + t^5$; Leading coefficient: -3

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12. $2 + r - r^3$

A) $r^3 + r + 2$; Leading coefficient: 1

B) $2 + r - r^3$; Leading coefficient: 2

C) $-r^3 + r + 2$; Leading coefficient: –1

D) $-r^3 + 2 + r$; Leading coefficient: –3

13. $\frac{1}{2}x - 3x^4 + 7$

A) $(1/2)x - 3x^4 + 7$; Leading coefficient: 1/2

B) $3x^4 + (1/2)x + 7$; Leading coefficient: 3

C) $7 + (1/2)x - 3x^4$; Leading coefficient: 7

D) $-3x^4 + (1/2)x + 7$; Leading coefficient: –3

14. $-9b^2 + 10b - b^6$

A) $-b^6 - 9b^2 + 10b$; Leading coefficient: –1

B) $b^6 - 9b^2 + 10b$; Leading coefficient: 1

C) $-9b^2 - b^6 + 10b$; Leading coefficient: –9

D) $10b - 9b^2 - b^6$; Leading coefficient: 10

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Find each sum or difference.

22. $(2h^2 - 5h) + (7h - 3h^2)$

A) $5h^2 + 2h$

B) $-h^2 + 2h$

C) $-h^2 - 12h$

D) $h^2 - 2h$

23. $(5f + g - 2) + (-2f + 3)$

A) $7f + g - 5$

B) $3f + g - 5$

C) $3f + g + 1$

D) $3f + 4g - 2$

24. $(6k^2 + 2k + 9) + (4k^2 - 5k)$

A) $10k^2 + 7k + 9$

B) $2k^2 - 3k + 9$

C) $10k^2 - 3k - 9$

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

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25. $(2c^2 + 6c + 4) + (5c^2 - 7)$

A) $7c^2 + 6c - 3$

B) $7c^2 + 6c + 11$

C) $-3c^2 + 6c - 3$

D) $7c^2 - c + 4$

26. $(2x + 3x^2) - (7 - 8x^2)$

A) $-5x^2 + 2x - 7$

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

C) $11x^2 + 2x + 7$

D) $-5x^2 + 2x + 7$

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Polynomials, Multiplying Polynomials, Q2: Multiply binomials by using the FOIL method, Page(649), Exercises(1-6)

Multiple Choice Questions - MCQ

Find each product

1. $(3c - 5)(c + 3)$

A) $3c^2 - 14c - 15$

B) $3c^2 + 14c - 15$

C) $3c^2 + 4c - 15$

D) $3c^2 - 4c + 15$

2. $(g + 10)(2g - 5)$

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

B) $2g^2 - 15g - 50$

C) $2g^2 + 25g - 50$

D) $2g^2 + 15g + 50$

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3. $(6a + 5)(5a + 3)$

A) $30a^2 + 33a + 15$

B) $30a^2 + 43a + 15$

C) $11a^2 + 43a + 8$

D) $30a^2 + 43a + 8$

4. $(4x + 1)(6x + 3)$

A) $24x^2 + 6x + 3$

B) $10x^2 + 18x + 3$

C) $24x^2 + 18x + 4$

D) $24x^2 + 18x + 3$

5. $(5y - 4)(3y - 1)$

A) $15y^2 - 17y + 4$

B) $15y^2 - 7y + 4$

C) $15y^2 + 17y + 4$

D) $15y^2 - 17y - 4$

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6. $(6d - 5)(4d - 7)$

A) $24d^2 - 22d + 35$

B) $24d^2 - 62d - 35$

C) $24d^2 - 62d + 35$

D) $24d^2 + 62d + 35$

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Polynomials, Using the distributive property,

Q3: Factor polynomials by using the distributive property and grouping, Page(671), Exercises(1-6)

Multiple Choice Questions - MCQ

Factor each polynomial, if possible. If the polynomial cannot be factored using integers, write prime.

11. $fg - 5g + 4f - 20$

A) (f - 4)(g + 5)

B) (f - 5)(g + 4)

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

D) (f + 4)(g - 5)

12. $a^2 - 4a - 24 + 6a$

A) (a + 6)(a - 4)

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

C) (a - 4)(a - 6)

D) (a + 4)(a + 6)

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13. $hj - 2h + 5j - 10$

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

B) (h + 2)(j - 5)

C) (h + 5)(j - 2)

D) (h - 2)(j + 5)

14. $xy - 2x - 2 + y$

A) (x - 1)(y + 2)

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

C) (x - 2)(y + 1)

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

15. $45pq - 27q - 50p + 30$

A) (9q - 10)(5p - 3)

B) (9q + 10)(5p + 3)

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

D) (9q + 3)(5p - 10)

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16. $24ty - 18t + 4y - 3$

A) (6t - 1)(4y + 3)

B) (6t + 1)(4y - 3)

C) (4t + 1)(6y - 3)

D) (6t + 3)(4y - 1)

17. $3dt - 21d + 35 - 5t$

A) (3d + 5)(t + 7)

B) (3d - 7)(t - 5)

C) (d - 5)(3t - 7)

D) (3d - 5)(t - 7)

18. $8r^2 + 12r$

A) 4r(2r + 3)

B) 2r(4r + 6)

C) 4r(r + 3)

D) 8r(r + 1.5)

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19. $21th - 3t - 35h + 5$

A) (3t + 5)(7h + 1)

B) (7t - 1)(3h - 5)

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

D) (3t - 5)(7h - 1)

20. $vp + 12v + 8p + 96$

A) (v + 8)(p + 12)

B) (v - 8)(p - 12)

C) (v + 12)(p + 8)

D) (v - 12)(p - 8)

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Polynomials, Factoring Quadratic Trinomials,

Q4: Factor trinomials of the form $x^2 + bx + c$,

Page(671), Exercises(1-6)

Multiple Choice Questions - MCQ

Factor each polynomial, if possible. If the polynomial cannot be factored using integers, write prime.

1. $x^2 + 17x + 42$

A) $(x + 6)(x + 7)$

B) $(x + 3)(x + 14)$

C) $(x - 3)(x - 14)$

D) $(x + 2)(x + 21)$

2. $y^2 - 17y + 72$

A) $(y - 8)(y - 9)$

B) $(y + 8)(y + 9)$

C) $(y - 6)(y - 12)$

D) $(y - 4)(y - 18)$

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3. $a^2 + 8a - 48$

A) (a – 12)(a + 4)

B) (a + 6)(a – 8)

C) (a + 12)(a – 4)

D) (a + 16)(a – 3)

4. $n^2 - 2n - 35$

A) (n + 7)(n – 5)

B) (n – 7)(n – 5)

C) (n – 35)(n + 1)

D) (n – 7)(n + 5)

5. $44 + 15h + h^2$

A) (h + 4)(h + 11)

B) (h – 4)(h – 11)

C) (h + 2)(h + 22)

D) (h + 4)(h – 11)

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6. $40 - 22x + x^2$

A) $(x + 2)(x + 20)$

B) $(x - 2)(x - 20)$

C) $(x - 4)(x - 10)$

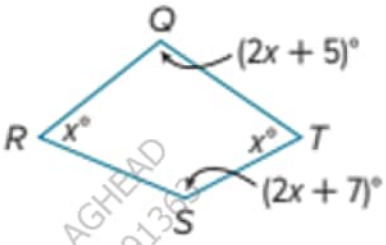
D) $(x - 5)(x - 8)$

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Quadrilaterals, Angles of Polygons, Q5: Find and use the sum of the measures of the interior angles of a polygon, Page(63), Exercises(1-4)

Multiple Choice Questions - MCQ

Find the measure of each interior angle of the polygon.



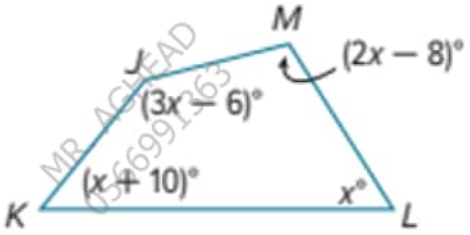
A) $m\angle Q = 121°, m\angle R = 58°, m\angle S = 123°, m\angle T = 58°$

B) $m\angle Q = 115°, m\angle R = 55°, m\angle S = 117°, m\angle T = 55°$

C) $m\angle Q = 125°, m\angle R = 60°, m\angle S = 127°, m\angle T = 60°$

D) $m\angle Q = 119°, m\angle R = 57°, m\angle S = 121°, m\angle T = 57°$

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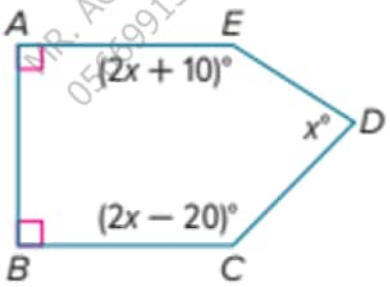


A) m∠J = 144°, m∠K = 60°, m∠L = 50°, m∠M = 92°

B) m∠J = 150°, m∠K = 62°, m∠L = 52°, m∠M = 96°

C) m∠J = 156°, m∠K = 64°, m∠L = 54°, m∠M = 100°

D) m∠J = 147°, m∠K = 61°, m∠L = 51°, m∠M = 94°



A) m∠A = 90°, m∠B = 90°, m∠C = 120°, m∠D = 70°, m∠E = 150°

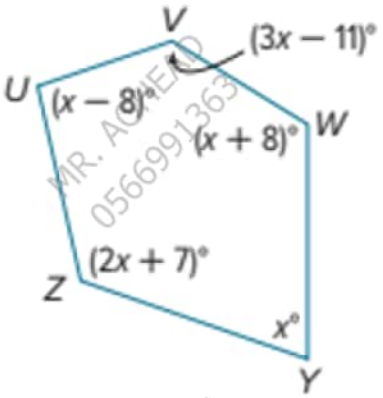
B) m∠A = 90°, m∠B = 90°, m∠C = 132°, m∠D = 76°, m∠E = 162°

C) m∠A = 90°, m∠B = 90°, m∠C = 128°, m∠D = 74°, m∠E = 158°

D) m∠A = 90°, m∠B = 90°, m∠C = 124°, m∠D = 72°, m∠E = 154°

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A) m∠U = 58°, m∠V = 187°, m∠W = 74°, m∠Y = 66°, m∠Z = 139°

B) m∠U = 62°, m∠V = 199°, m∠W = 78°, m∠Y = 70°, m∠Z = 147°

C) m∠U = 64°, m∠V = 205°, m∠W = 80°, m∠Y = 72°, m∠Z = 151°

D) m∠U = 60°, m∠V = 193°, m∠W = 76°, m∠Y = 68°, m∠Z = 143°

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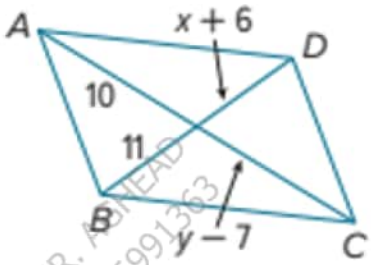
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Quadrilaterals, Parallelograms, Q6: Recognize and apply the properties of the sides and angles of parallelograms, Page(72), Exercises(9-12)

Multiple Choice Questions - MCQ

Find the value of each variable in each parallelogram.



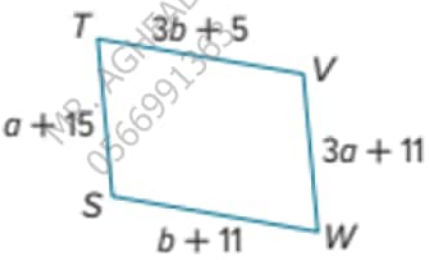
A) x = 5, y = 17

B) x = 17, y = 3

C) x = 4, y = 18

D) x = 5, y = 3

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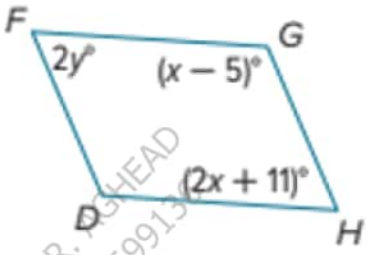


A) a = 3, b = 2

B) a = 2, b = 3

C) a = 4, b = 3

D) a = 2, b = 8

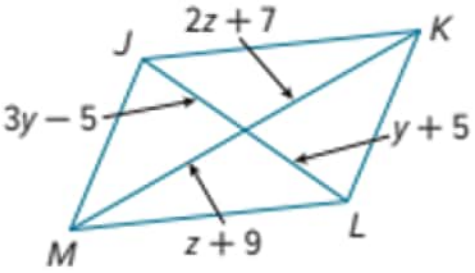


A) x = 58, y = 26.5

B) x = 62, y = 67.5

C) x = 58, y = 63.5

D) x = 16, y = 21.5



A) y = 2, z = 5

B) y = 5, z = 16

C) y = 0, z = 2

D) y = 5, z = 2

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Quadrilaterals, Tests for Parallelograms, Q7: Recognize the conditions that ensure a quadrilateral is a parallelogram, Page(75-79), Exercises(Learn 1-6)

Multiple Choice Questions - MCQ

Determine whether the quadrilateral is a parallelogram. Justify your answer.



A) Yes; both pairs of opposite sides are congruent.

B) Yes; the diagonals bisect each other.

C) No; only one pair of opposite sides is congruent.

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

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1.



A) No; both pairs of sides must be marked parallel.

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

C) Yes; the diagonals bisect each other.

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

2.



A) No; angle measures alone cannot prove a parallelogram.

B) Yes; one pair of opposite sides is parallel and congruent.

C) Yes; both pairs of opposite angles are congruent.

D) Yes; the diagonals bisect each other.

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3.



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A) Yes; one pair of opposite sides is congruent.

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

C) Yes; one pair of opposite sides is parallel and congruent.

D) No; none of the tests for parallelograms are fulfilled.

4.



A) Yes; both pairs of opposite sides are congruent.

B) No; the sides are not marked parallel.

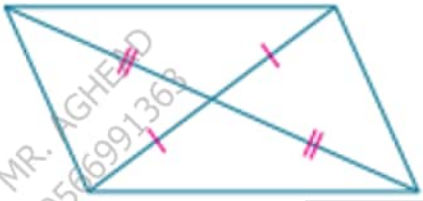
C) Yes; the diagonals bisect each other.

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

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5.



A) No; the diagonals must be perpendicular.

B) Yes; the diagonals bisect each other.

C) Yes; both pairs of opposite angles are congruent.

D) No; the diagonals are not congruent.

6.



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

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

C) No; the parallel sides and the congruent sides are not the same pair (tests for parallelograms are not fulfilled).

D) Yes; by definition of a parallelogram.

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Quadrilaterals, Trapezoids and Kites, Q8:

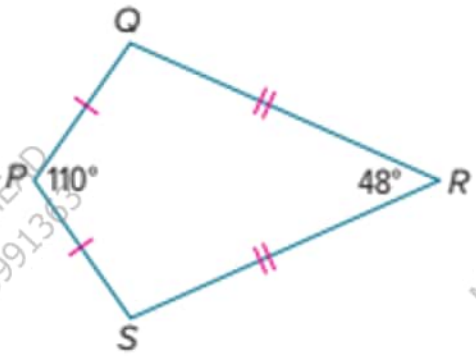
Recognize and apply the properties of kites,

Page(106), Exercises(13-16)

Multiple Choice Questions - MCQ

Find each measure in the kites.

$m\angle Q$



A) 79°

B) 158°

C) 110°

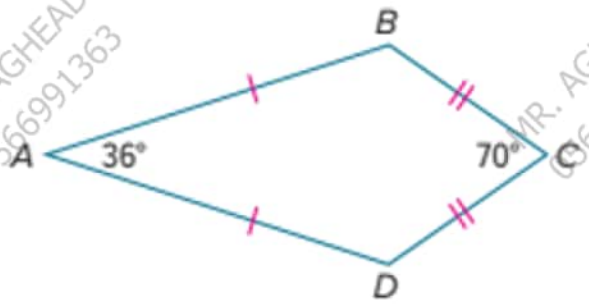
D) 101°

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$m\angle D$



A) 127°

B) 106°

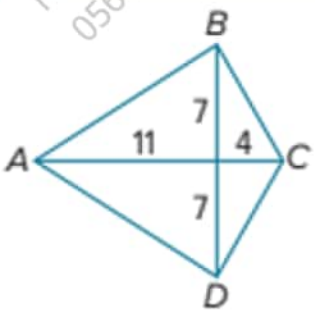
C) 144°

D) 254°

Quadrilateral ABCD is a kite

(a) Find BC in simplest radical form.

(b) Find the perimeter of kite ABCD rounded to the nearest tenth.



A) BC = √33 ; Perimeter ≈ 37.6

B) BC = √65 ; Perimeter ≈ 42.2

C) BC = √170 ; Perimeter ≈ 42.2

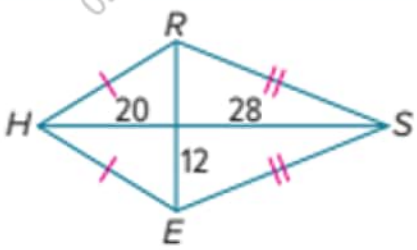
D) BC = √65 ; Perimeter ≈ 21.1

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Quadrilateral HRSE is a kite

(a) Find RH in simplest radical form.

(b) Find the perimeter of kite HRSE rounded to the nearest tenth.



A) RH = $4\sqrt{58}$; Perimeter ≈ 107.6

B) RH = $4\sqrt{34}$; Perimeter ≈ 53.8

C) RH = $4\sqrt{34}$; Perimeter ≈ 107.6

D) RH = $2\sqrt{136}$; Perimeter ≈ 96.0

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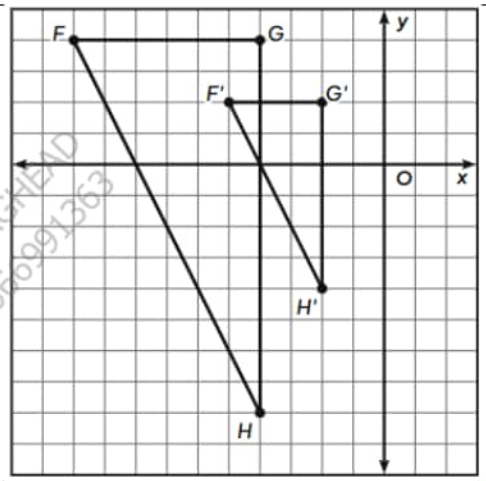
Similarity, Dilations, Q9: Find the scale factor of dilation, Page(120, 121), Exercises(13-16, 20)

Multiple Choice Questions - MCQ

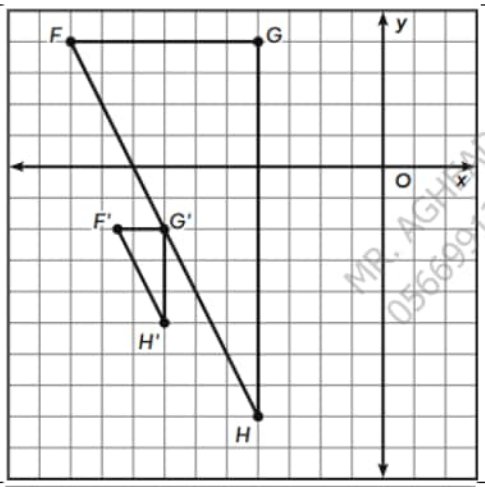
Graph the image of each polygon with the given vertices after a dilation centered at the origin with the given scale factor.

13. $F(-10, 4), G(-4, 4), H(-4, -8), k = 0.25$

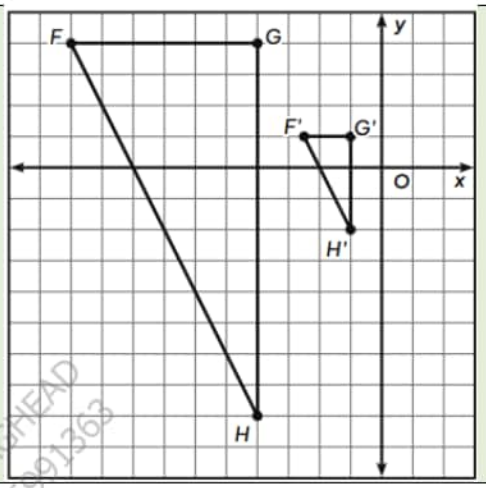
A)



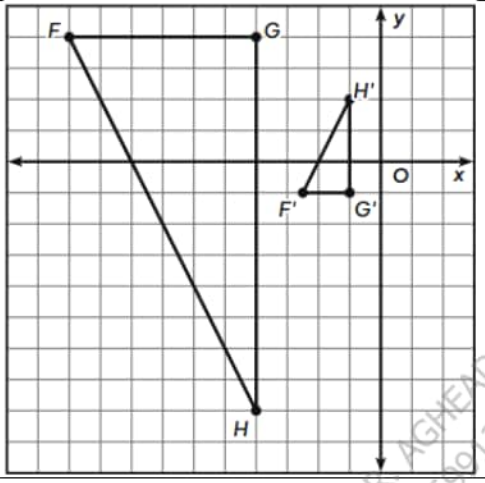
B)



C)



D)



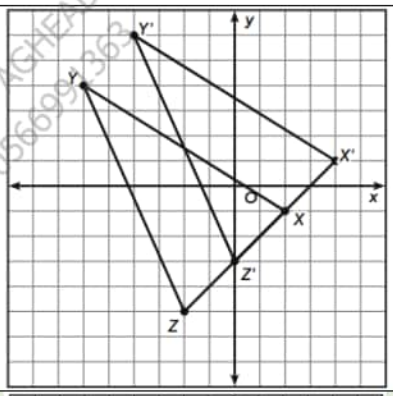
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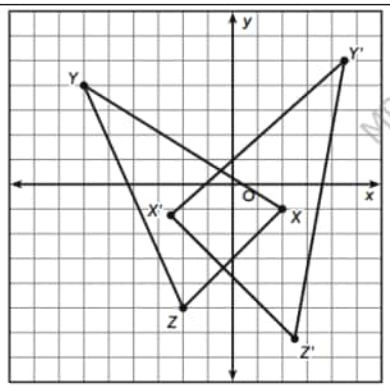
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14. $X(2, -1), Y(-6, 4), Z(-2, -5), k = \frac{5}{4}$

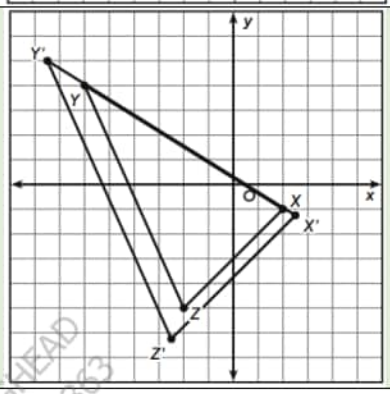
A)



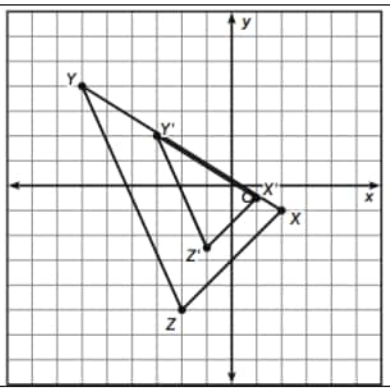
B)



C)

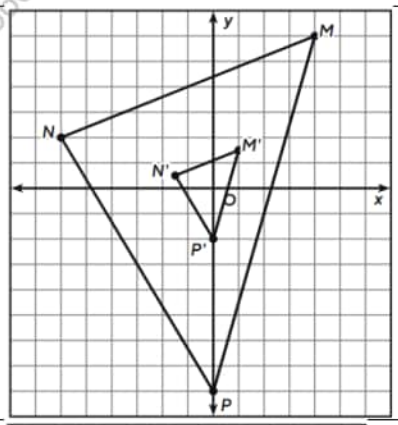


D)

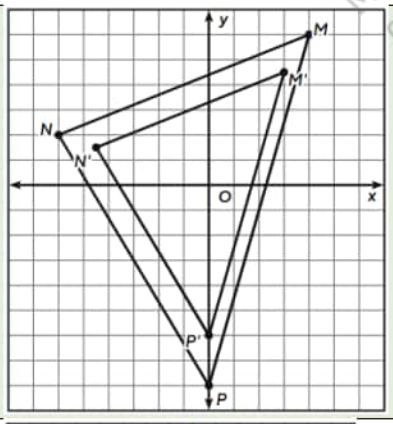


15. $M(4, 6), N(-6, 2), P(0, -8), k = \frac{3}{4}$

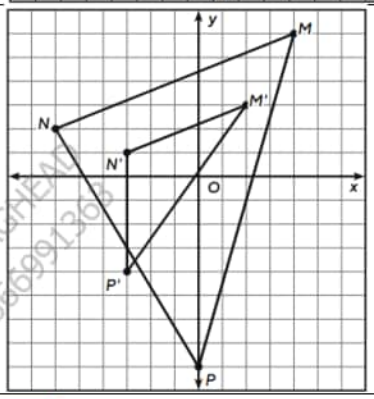
A)



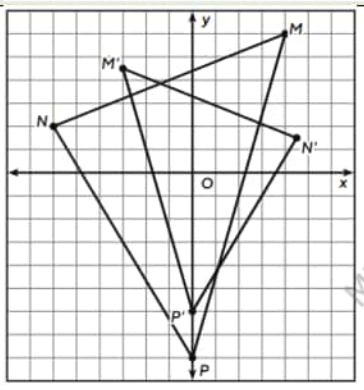
B)



C)



D)

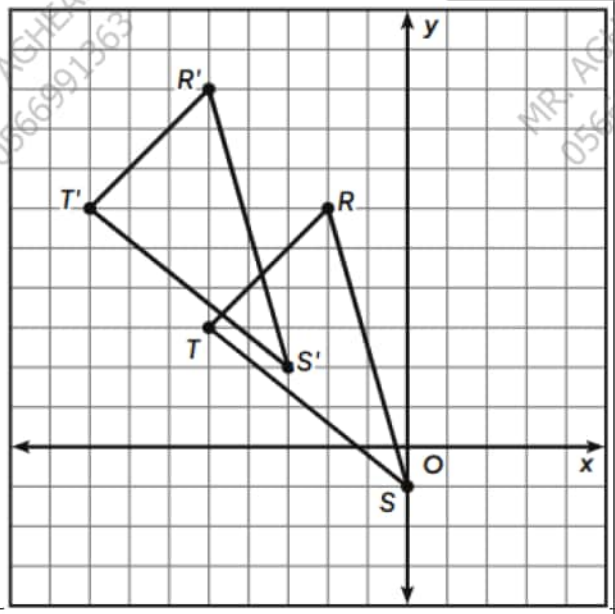


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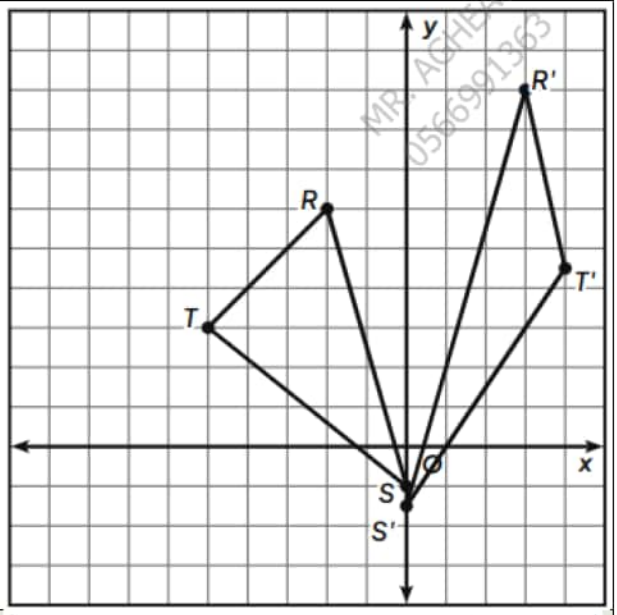
احصل على الشرح كاملاً بـ 149 درهم فقط

16. $R(-2, 6)$, $S(0, -1)$, $T(-5, 3)$, $k = 1.5$

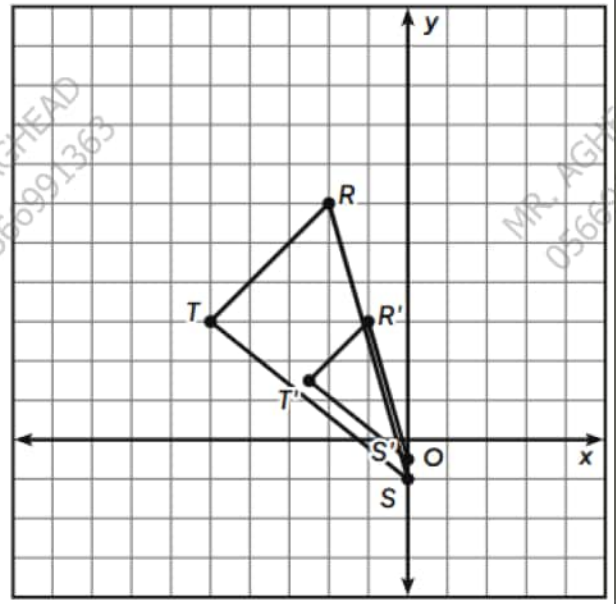
A)



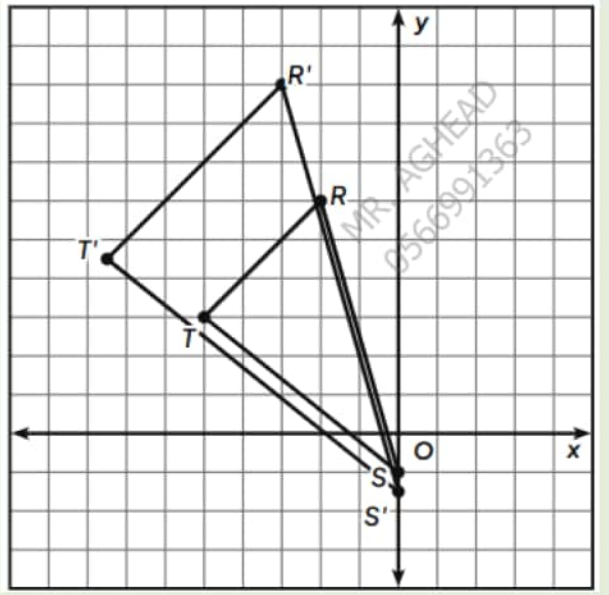
B)



C)



D)



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△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′(12.5, 5)

B) C′(7.5, 4.5)

C) C′(5, 10)

D) C′(2, 0.8)

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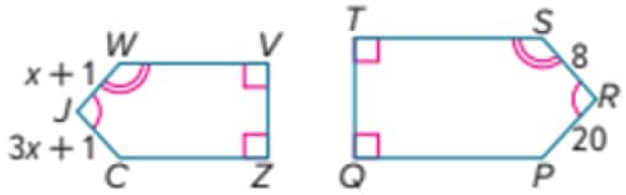
احصل على الشرح كاملاً بـ 149 درهم فقط

Similarity, Similar Polygons, Q10: Solve problems using the properties of similar polygons, Page(128), Exercises(11-14)

Multiple Choice Questions - MCQ

Each pair of polygons is similar. Find the value of x.

11.



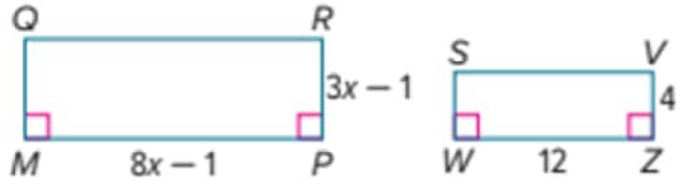
A) x = 2

B) x = 3

C) x = 4

D) x = 5

12.



A) x = 1

B) x = 3

C) x = 2

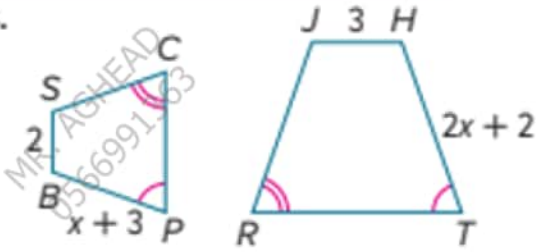
D) x = 4

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13.



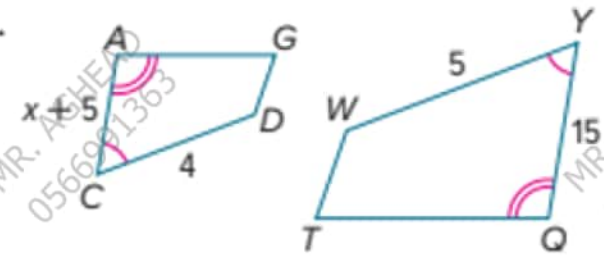
A) x = 3

B) x = 4

C) x = 6

D) x = 5

14.



A) x = 7

B) x = 12

C) x = 5

D) x = 9

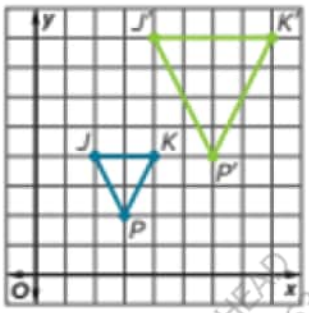
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Similarity, Dilations, Q11: Find the scale factor of a dilation, Page(120), Exercises(10-12, 17-18)

Multiple Choice Questions - MCQ

Find the scale factor of the dilation

$\triangle J'K'P'$ is the image of $\triangle JKP$.



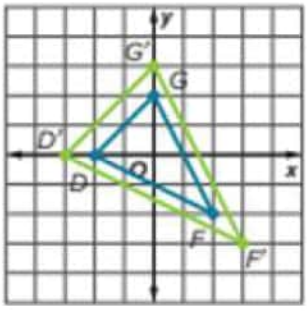
A) $k = \frac{1}{2}$

B) $k = 2$

C) $k = 3$

D) $k = 1.5$

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



A) $k = 2/3$

B) $k = 2$

C) $k = 1.5$

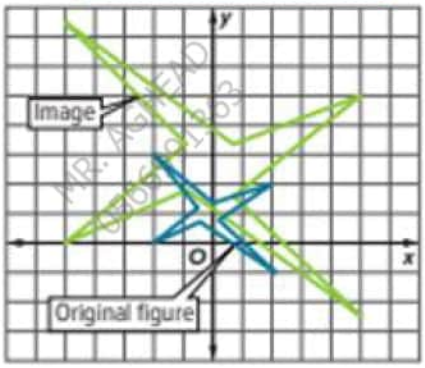
D) $k = 3$

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احصل على الشرح كاملاً بـ 149 درهم فقط

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



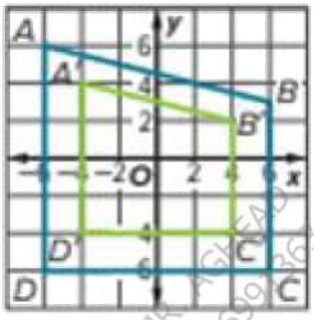
A) k = 0.5

B) k = 1.5

C) k = 4

D) k = 2

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



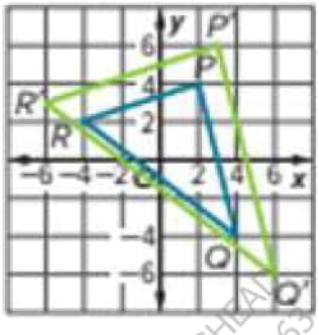
A) k = 0.5

B) k = 2

C) k = 1/3

D) k = 3/4

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



A) k = 2/3

B) k = 1.5

C) k = 2

D) k = 1/2

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احصل على الشرح كاملاً بـ 149 درهم فقط

Similarity, Similar Triangles: AA Similarity, Q12: Identify similar triangles using the AA Similarity Postulate, Page(133), Exercises(1-8)

Multiple Choice Questions - MCQ

Determine whether each pair of triangles is similar. Explain your reasoning.

1.



A) Yes; $\triangle FGH \sim \triangle JKH$ by the AA Similarity Postulate.

B) No; only one pair of angles is congruent.

C) Yes; $\triangle FGH \sim \triangle KHJ$ by the SSS Similarity Theorem.

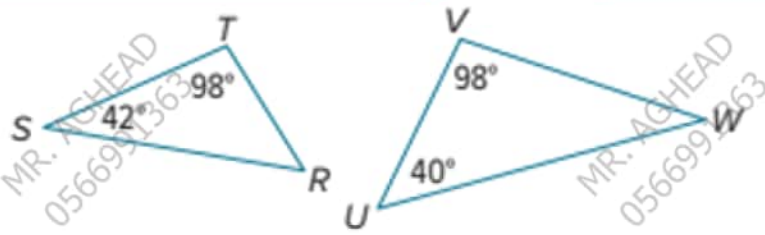
D) No; corresponding sides are not proportional.

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2.



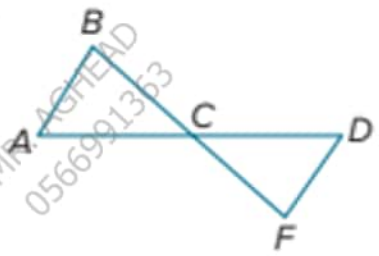
A) No; 42° ≠ 40°, so the triangles are not similar.

B) Yes; △STR ~ △WVU by the AA Similarity Postulate (since m∠R = 180° – 98° – 42° = 40° = m∠U).

C) Yes; △STR ~ △UVW by the SAS Similarity Theorem.

D) No; side lengths are needed to prove similarity.

3.



A) Yes; △ABC ~ △FDC by the AA Similarity Postulate.

B) Yes; △ABC ~ △DFC because vertical angles are congruent.

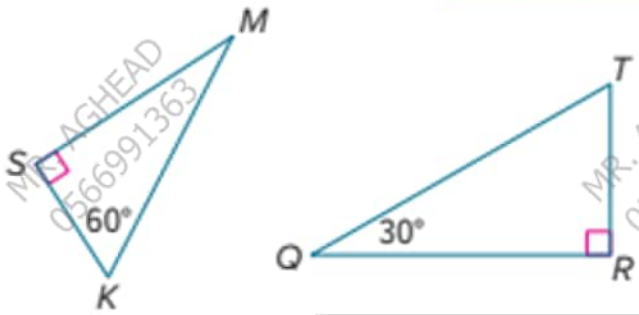
C) No; there is not enough information to determine whether the triangles are similar (only one pair of congruent angles is known).

D) Yes; by the Third Angles Theorem.

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4.



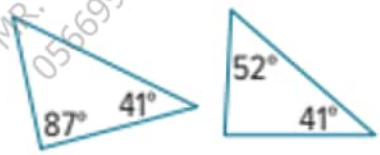
A) No; 60° ≠ 30°, so the triangles are not similar.

B) No; right triangles are never similar unless their hypotenuses are equal.

C) Yes; △MSK ~ △TRQ by SSS Similarity.

D) Yes; △MSK ~ △QRT by the AA Similarity Postulate (since m∠M = 90° – 60° = 30° = m∠Q).

5.



A) Yes; the triangles are similar by the AA Similarity Postulate (since 180° – 87° – 41° = 52°).

B) No; 87° ≠ 52°, so the triangles are not similar.

C) No; at least one side length is required.

D) Yes; by the SSS Similarity Theorem.

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6.



A) Yes; the triangles are similar with scale factor 4/3.

B) No; the ratios of corresponding sides are not equal (10/8 = 1.25 ≠ 12/9 = 1.33).

C) Yes; the triangles are similar by the AA Similarity Postulate.

D) Yes; the triangles are similar with scale factor 5/4.

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) 120 feet

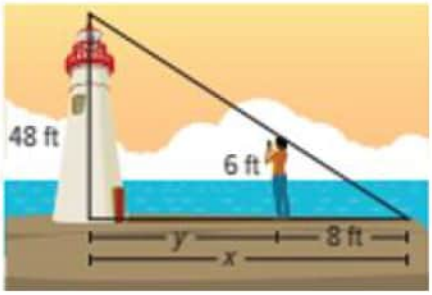
B) 150 feet

C) 135 feet

D) 140 feet

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Maya (6 ft tall) stands near a 48-ft-tall lighthouse. Her shadow is 8 ft long, and the end of her shadow coincides with the end of the lighthouse's shadow. (a) What is the distance x from the lighthouse to the end of the shadow? (b) What is the distance y from Maya to the lighthouse?



A) (a) x = 56 ft ; (b) y = 48 ft

B) (a) x = 64 ft ; (b) y = 64 ft

C) (a) x = 72 ft ; (b) y = 64 ft

D) (a) x = 64 ft ; (b) y = 56 ft

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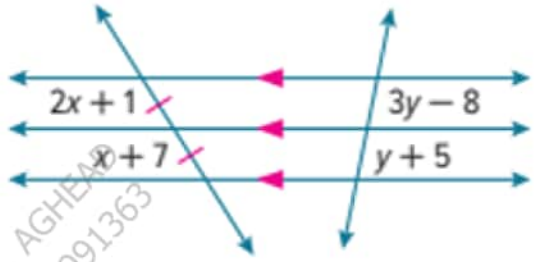
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Similarity, Triangle Proportionality, Q13: Use proportional parts within triangles, Page(146), Exercises(11-16)

Multiple Choice Questions - MCQ

Find the values of x and y.

11.



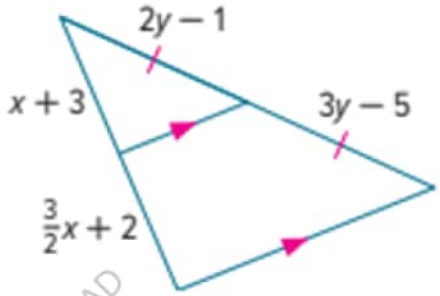
A) x = 6, y = 6.5

B) x = 8, y = 6.5

C) x = 6, y = 4.5

D) x = 7, y = 6

12.



A) x = 4, y = 2

B) x = 2, y = 4

C) x = 3, y = 4

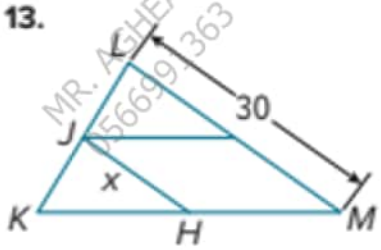
D) x = 2, y = 3

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$\overline{JH}$ is a midsegment of △KLM. Find the value of x.

13.



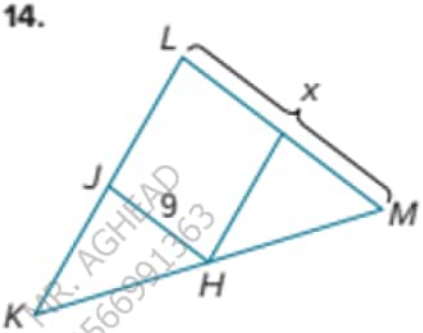
A) x = 60

B) x = 10

C) x = 15

D) x = 20

14.



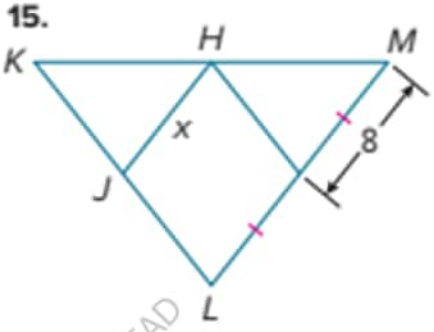
A) x = 4.5

B) x = 9

C) x = 27

D) x = 18

15.



A) x = 8

B) x = 16

C) x = 4

D) x = 12

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In △ABC, $\overline{DE}$ is parallel to $\overline{AC}$ and DE = 10. Find the length of $\overline{AC}$ if $\overline{DE}$ is a midsegment of △ABC.

A) AC = 5

B) AC = 20

C) AC = 10

D) AC = 30

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Similarity, Parts of Similar Triangles, Q14:

Recognize and use proportional relationships of corresponding angle bisectors, altitudes, and medians of similar triangles, Page(153), Exercises(1-11)

Multiple Choice Questions - MCQ

Each pair of triangles is similar. Find the value of x.

1.



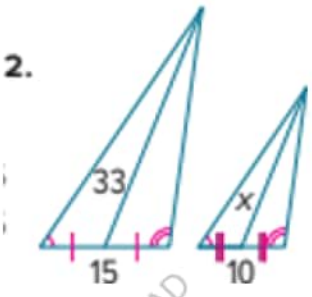
A) x = 15.5

B) x = 17.5

C) x = 16.5

D) x = 18.0

2.



A) x = 20

B) x = 24

C) x = 18

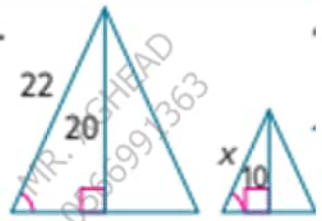
D) x = 22

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3.



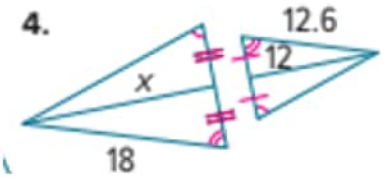
A) x = 11

B) x = 12

C) x = 10

D) x = 44

4.



A) x = 15.4

B) x = 17.1

C) x = 8.4

D) x = 16.2

If △RST ~ △EFG, $\overline{SH}$ is an altitude of △RST, $\overline{FJ}$ is an altitude of △EFG, ST = 6, SH = 5, and FJ = 7, find FG.



A) FG = 7.5

B) FG = 4.3

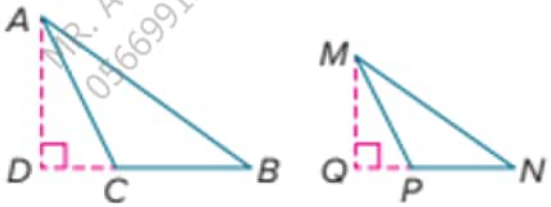
C) FG = 8.4

D) FG = 9.2

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If △ABC ~ △MNP, $\overline{AD}$ is an altitude of △ABC, $\overline{MQ}$ is an altitude of △MNP, AB = 24, AD = 14, and MQ = 10.5, find MN.



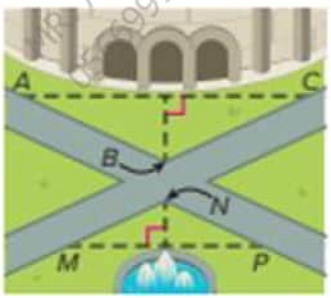
A) MN = 16

B) MN = 20.5

C) MN = 32

D) MN = 18

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) 7 yards

B) 10 yards

C) 4 yards

D) 12 yards

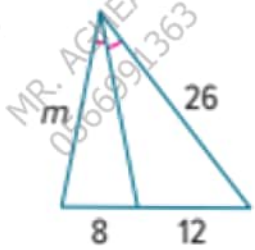
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Find the value of each variable to the nearest tenth

8.



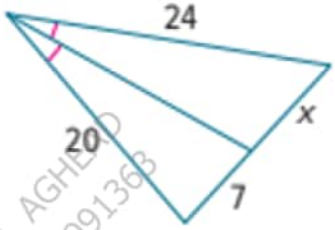
A) m ≈ 15.6

B) m ≈ 17.3

C) m ≈ 19.5

D) m ≈ 39.0

9.



A) x = 5.8

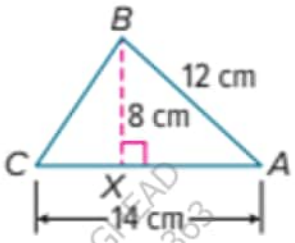
B) x = 9.6

C) x = 8.4

D) x = 7.8

△ABC ~ △DEF

10. Find the length of $\overline{XC}$ to the nearest tenth.



A) 8.9 cm

B) 6.0 cm

C) 4.5 cm

D) 5.1 cm

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11. Find the length of $\overline{EY}$ to the nearest tenth.



A) 5.3 cm

B) 6.0 cm

C) 4.8 cm

D) 12.0 cm

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Right Triangles and Trigonometry, Geometric Mean, Q15: Find the geometric mean between two numbers, Page(165), Exercises(1-6, 11-14)

Multiple Choice Questions - MCQ

Find the geometric mean between each pair of numbers.

1. 4 and 6

A) 5

B) $2\sqrt{6}$ (≈ 4.9)

C) $4\sqrt{6}$ (≈ 9.8)

D) 24

2. $\frac{1}{2}$ and 2

A) 1.25

B) $\sqrt{2}$

C) 1

D) 2

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3. 4 and 25

- A) 14.5
- B) 20
- C) 100
- D) 10 ✓

4. 12 and 20

- A) $4\sqrt{15}$ (≈ 15.5) ✓
- B) 16
- C) $2\sqrt{60}$ (≈ 15.0)
- D) $8\sqrt{15}$ (≈ 31.0)

5. 17 and 3

- A) 10
- B) $\sqrt{51}$ (≈ 7.1) ✓
- C) $3\sqrt{17}$ (≈ 12.4)
- D) 51

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6. 3 and 24

A) 13.5

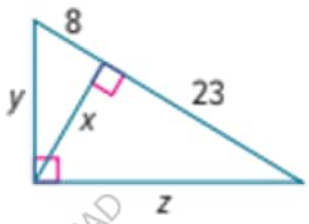
B) $3\sqrt{8}$ (≈ 7.5)

C) $6\sqrt{2}$ (≈ 8.5)

D) $12\sqrt{2}$ (≈ 17.0)

Find the values of x, y, and z.

11.



A) x = 15, y = 17, z = 28

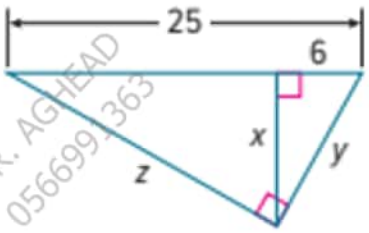
B) x = $\sqrt{184}$ (≈ 13.6), y = $\sqrt{713}$ (≈ 26.7), z = $\sqrt{248}$ (≈ 15.7)

C) x = 15.5, y = $\sqrt{248}$ (≈ 15.7), z = $\sqrt{713}$ (≈ 26.7)

D) x = $2\sqrt{46}$ (≈ 13.6), y = $2\sqrt{62}$ (≈ 15.7), z = $\sqrt{713}$ (≈ 26.7)

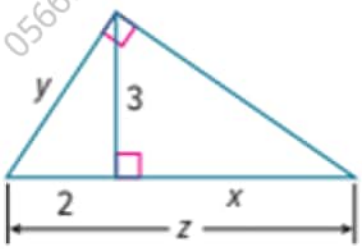
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12.



A) $x = \sqrt{114}\ (\approx 10.7),\ y = 5\sqrt{6}\ (\approx 12.2),\ z = 5\sqrt{19}\ (\approx 21.8)$
B) $x = 5\sqrt{6}\ (\approx 12.2),\ y = \sqrt{114}\ (\approx 10.7),\ z = 5\sqrt{19}\ (\approx 21.8)$
C) $x = \sqrt{150}\ (\approx 12.2),\ y = 15,\ z = 20$
D) $x = \sqrt{114}\ (\approx 10.7),\ y = 5\sqrt{19}\ (\approx 21.8),\ z = 5\sqrt{6}\ (\approx 12.2)$

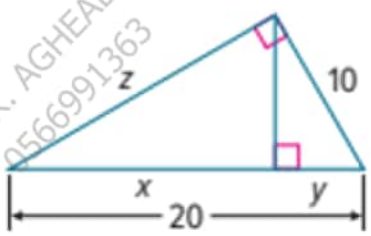
13.



A) $x = 4.5,\ y = 6,\ z = 6.5$
B) $x = 4.5,\ y = \sqrt{13}\ (\approx 3.6),\ z = 6.5$
C) $x = 6,\ y = \sqrt{13}\ (\approx 3.6),\ z = 8$
D) $x = 4.5,\ y = \sqrt{13}\ (\approx 3.6),\ z = 9$

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14.



A) $x = 10, y = 10, z = 10\sqrt{2}$ (≈ 14.1)

B) $x = 5, y = 15, z = 10\sqrt{3}$ (≈ 17.3)

C) $x = 15, y = 5, z = 10\sqrt{3}$ (≈ 17.3)

D) $x = 16, y = 4, z = 12$

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Right Triangles and Trigonometry, Pythagorean Theorem and Its Converse, Q16: Use the Pythagorean Theorem and its converse, Page(171-172), Exercises(7-12, 20-22)

Multiple Choice Questions - MCQ

Use a Pythagorean Triple to find the value of x.

7.



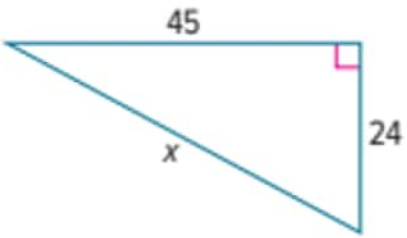
A) x = 12

B) x = 13

C) x = 14

D) x = 15

8.



A) x = 51

B) x = 49

C) x = 53

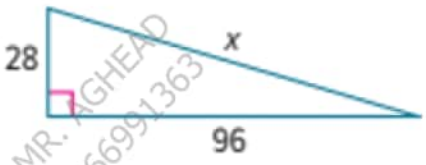
D) x = 69

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9.



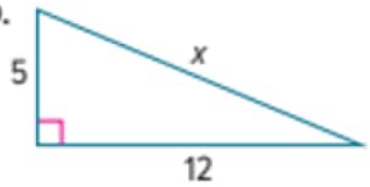
A) x = 104

B) x = 100

C) x = 98

D) x = 124

10.



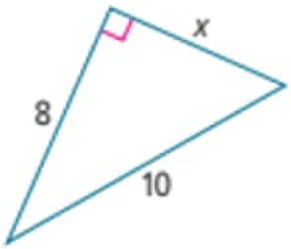
A) x = 15

B) x = 17

C) x = 13

D) x = 11

11.



A) x = 4

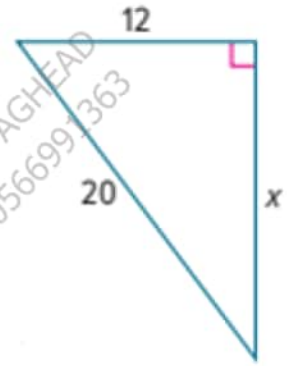
B) x = 5

C) x = 7

D) x = 6

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12.



A) x = 16

B) x = 14

C) x = 15

D) x = 18

Determine whether each set of measures can be the measures of the sides of a triangle. If so, classify the triangle as acute, obtuse, or right.

20. $\sqrt{5}, \sqrt{12}, \sqrt{13}$

A) Yes; right triangle

B) Yes; acute triangle

C) Yes; obtuse triangle

D) No; cannot form a triangle

21. $2, \sqrt{8}, \sqrt{12}$

A) Yes; acute triangle

B) Yes; obtuse triangle

C) Yes; right triangle

D) No; cannot form a triangle

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22. 9, 40, 41

A) Yes; acute triangle

B) Yes; obtuse triangle

C) No; cannot form a triangle

D) Yes; right triangle

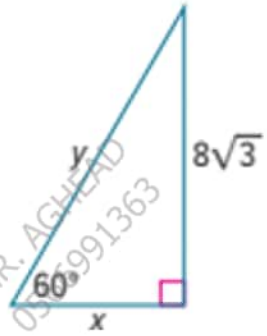
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Right Triangles and Trigonometry, Special Right Triangles, Q17: Use the properties of 45°-45°-90° triangles and 30°-60°-90° triangles, Page(184-185), Exercises(19-25, 33-38)

Multiple Choice Questions - MCQ

Find the values of x and y.

19.



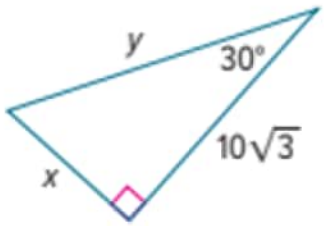
A) x = 8, y = 16

B) x = 16, y = 8

C) x = 8√3, y = 16√3

D) x = 4, y = 8

20.



A) x = 20, y = 10

B) x = 10, y = 20

C) x = 5, y = 10

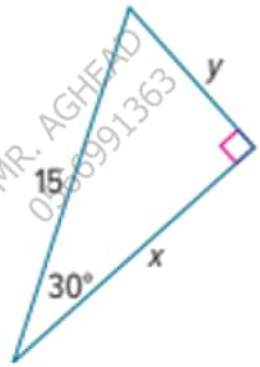
D) x = 10√3, y = 20√3

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21.



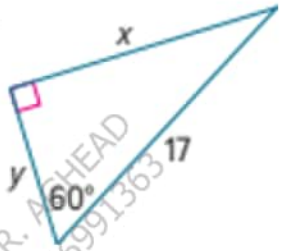
A) $x = 7.5, y = (15\sqrt{3})/2$

B) $x = 15\sqrt{3}, y = 7.5$

C) $x = (15\sqrt{3})/2, y = 7.5$

D) $x = 5\sqrt{3}, y = 5$

22.



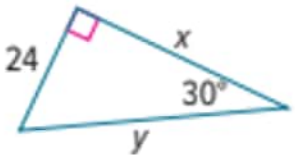
A) $x = 8.5, y = (17\sqrt{3})/2$

B) $x = 17\sqrt{3}, y = 8.5$

C) $x = (17\sqrt{2})/2, y = 8.5$

D) $x = (17\sqrt{3})/2, y = 8.5$

23.



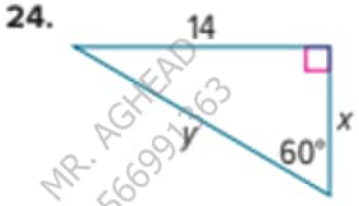
A) $x = 24\sqrt{3}, y = 48$

B) $x = 48, y = 24\sqrt{3}$

C) $x = 8\sqrt{3}, y = 16\sqrt{3}$

D) $x = 12\sqrt{3}, y = 24$

24.



A) $x = 7, y = 14\sqrt{3}$

B) $x = (14\sqrt{3})/3, y = (28\sqrt{3})/3$

C) $x = (28\sqrt{3})/3, y = (14\sqrt{3})/3$

D) $x = 14\sqrt{3}, y = 28$

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) $20\sqrt{3}$ feet

B) $20\sqrt{2}$ feet

C) 20 feet

D) 40 feet

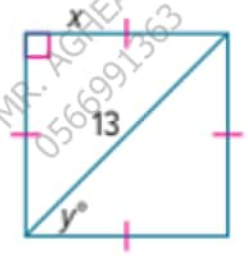
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Find the values of x and y.

33.



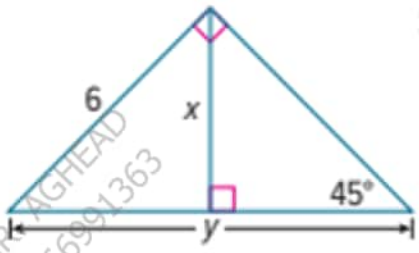
A) $x = 13\sqrt{2}, y = 45$

B) $x = (13\sqrt{2})/2, y = 60$

C) $x = 6.5, y = 45$

D) $x = (13\sqrt{2})/2, y = 45$

34.



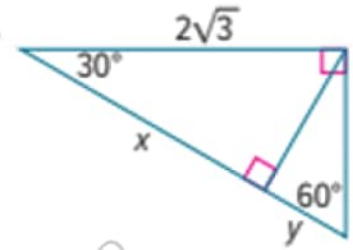
A) $x = 3\sqrt{2}, y = 6\sqrt{2}$

B) $x = 6\sqrt{2}, y = 3\sqrt{2}$

C) $x = 3, y = 6$

D) $x = 3\sqrt{3}, y = 6\sqrt{3}$

35.



A) $x = 2, y = 2$

B) $x = 3, y = 1$

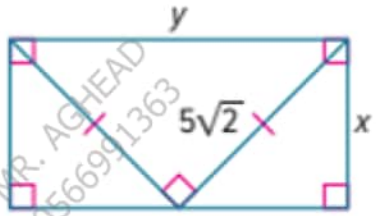
C) $x = 1, y = 3$

D) $x = 2\sqrt{3}, y = 1$

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36.



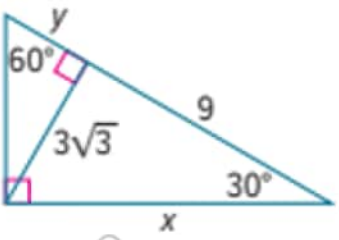
A) x = 10, y = 5

B) x = 5√2, y = 10√2

C) x = 5, y = 10

D) x = 5, y = 5√2

37.



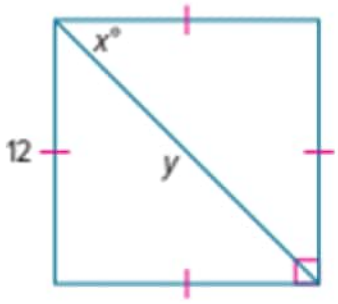
A) x = 3, y = 6√3

B) x = 9√3, y = 3

C) x = 6, y = 3√3

D) x = 6√3, y = 3

38.



A) x = 45, y = 12√2

B) x = 45, y = 24

C) x = 60, y = 12√3

D) x = 45, y = 6√2

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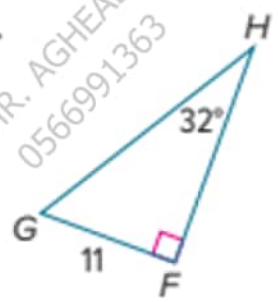
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Right Triangles and Trigonometry, Trigonometry, Q18: Use trigonometric ratios to find side lengths and angle measures of right triangles, Page(192-193), Exercises(22-27, 30-32)

Multiple Choice Questions - MCQ

Solve each right triangle. Round side measures to the nearest tenth and angle measures to the nearest degree.

22.



A) $m\angle G = 58°$, $FH \approx 6.9$, $GH \approx 13.0$

B) $m\angle G = 58°$, $FH \approx 17.6$, $GH \approx 20.8$

C) $m\angle G = 68°$, $FH \approx 17.6$, $GH \approx 20.8$

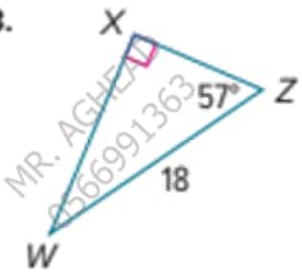
D) $m\angle G = 58°$, $FH \approx 20.8$, $GH \approx 17.6$

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23.



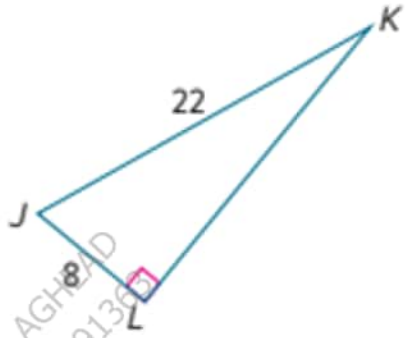
A) $m\angle W = 33°$, $XZ \approx 15.1$, $WX \approx 9.8$

B) $m\angle W = 43°$, $XZ \approx 9.8$, $WX \approx 15.1$

C) $m\angle W = 33°$, $XZ \approx 9.8$, $WX \approx 15.1$

D) $m\angle W = 33°$, $XZ \approx 11.7$, $WX \approx 27.7$

24.



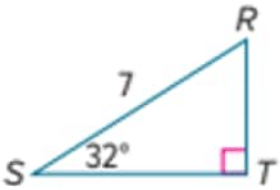
A) $KL \approx 20.5$, $m\angle J \approx 21°$, $m\angle K \approx 69°$

B) $KL \approx 23.4$, $m\angle J \approx 69°$, $m\angle K \approx 21°$

C) $KL \approx 19.5$, $m\angle J \approx 65°$, $m\angle K \approx 25°$

D) $KL \approx 20.5$, $m\angle J \approx 69°$, $m\angle K \approx 21°$

25.



A) $m\angle R = 58°$, $RT \approx 3.7$, $ST \approx 5.9$

B) $m\angle R = 58°$, $RT \approx 5.9$, $ST \approx 3.7$

C) $m\angle R = 68°$, $RT \approx 3.7$, $ST \approx 5.9$

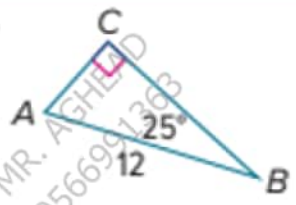
D) $m\angle R = 58°$, $RT \approx 4.4$, $ST \approx 8.3$

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26.



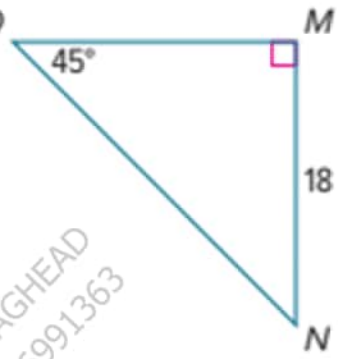
A) $m\angle A = 65°$, $AC \approx 10.9$, $BC \approx 5.1$

B) $m\angle A = 65°$, $AC \approx 5.1$, $BC \approx 10.9$

C) $m\angle A = 75°$, $AC \approx 5.1$, $BC \approx 10.9$

D) $m\angle A = 65°$, $AC \approx 5.6$, $BC \approx 13.2$

27.



A) $m\angle N = 45°$, $MQ = 9$, $QN \approx 18.0$

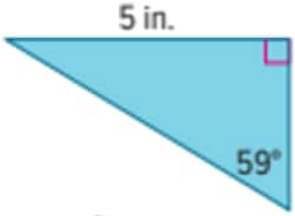
B) $m\angle N = 45°$, $MQ = 18$, $QN \approx 36.0$

C) $m\angle N = 45°$, $MQ = 18$, $QN \approx 25.5$

D) $m\angle N = 55°$, $MQ = 18$, $QN \approx 25.5$

Find the perimeter and area of each triangle. Round to the nearest hundredth.

30.



A) Perimeter ≈ 15.20 in. ; Area ≈ 8.32 in²

B) Perimeter ≈ 13.84 in. ; Area ≈ 15.02 in²

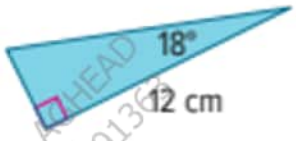
C) Perimeter ≈ 12.50 in. ; Area ≈ 7.51 in²

D) Perimeter ≈ 13.84 in. ; Area ≈ 7.51 in²

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31.



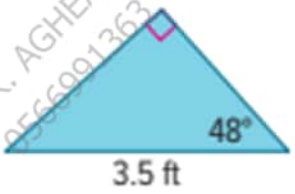
A) Perimeter ≈ 28.52 cm ; Area ≈ 23.39 cm²

B) Perimeter ≈ 28.52 cm ; Area ≈ 46.79 cm²

C) Perimeter ≈ 30.15 cm ; Area ≈ 23.39 cm²

D) Perimeter ≈ 26.40 cm ; Area ≈ 21.15 cm²

32.



A) Perimeter ≈ 8.44 ft ; Area ≈ 6.09 ft²

B) Perimeter ≈ 8.44 ft ; Area ≈ 3.05 ft²

C) Perimeter ≈ 9.12 ft ; Area ≈ 3.05 ft²

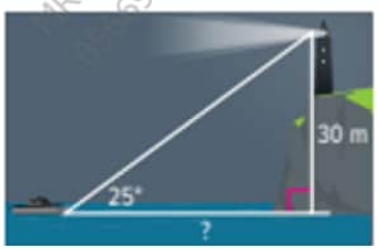
D) Perimeter ≈ 7.95 ft ; Area ≈ 2.85 ft²

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Right Triangles and Trigonometry, Applying Trigonometry, Q19: Use trigonometric ratios to find side lengths and angle measures of right triangles, Page(199), Exercises(1-7)

Multiple Choice Questions - MCQ

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) 14 m

B) 71 m

C) 64 m

D) 33 m

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احصل على الشرح كاملاً بـ 149 درهم فقط

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) 16.5°

B) 14.0°

C) 19.1°

D) 13.5°

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) 21 ft

B) 43 ft

C) 17 ft

D) 25 ft

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احصل على الشرح كاملاً بـ 149 درهم فقط

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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 to the nearest tenth of a degree.

A) 59.0°

B) 57.7°

C) 32.3°

D) 55.4°

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) 33°

B) 44°

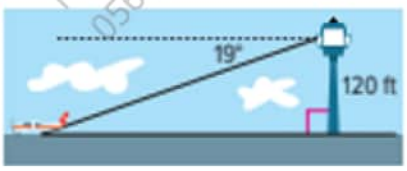
C) 35°

D) 55°

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احصل على الشرح كاملاً بـ 149 درهم فقط

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) 368.6 ft

B) 41.3 ft

C) 312.4 ft

D) 348.5 ft

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) 14.8°

B) 15.3°

C) 75.2°

D) 12.6°

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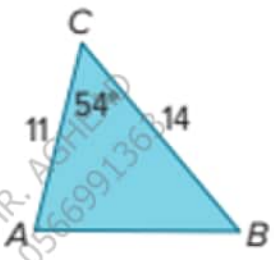
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Right Triangles and Trigonometry, Applying Trigonometry, Q20: Find the area of a triangle using two sides and an included angle, Page(200-201), Exercises(13-21)

Free Response Questions - FRQ

Use trigonometry to find the area of △ABC to the nearest tenth.

13.



C: Area = (1/2) a b sin C

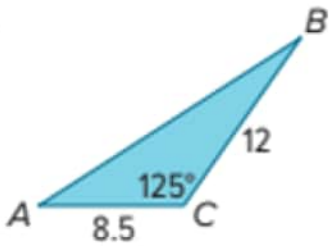
a = 14, b = 11,

and C = 54°: Area = (1/2)(14)(11)

sin 54° = 77 × sin 54°.

Evaluate and round to the nearest tenth: Area ≈ 77 × 0.8090 ≈ 62.3 units².

14.



C: Area = (1/2) a b sin C.

a = 12, b = 8.5,

and C = 125°: Area = (1/2)(12)(8.5)

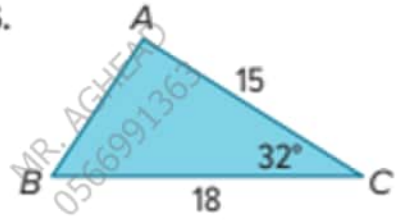
sin 125° = 51 × sin 125°.

Evaluate and round to the nearest tenth: Area ≈ 51 × 0.8192 ≈ 41.8 units².

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15.

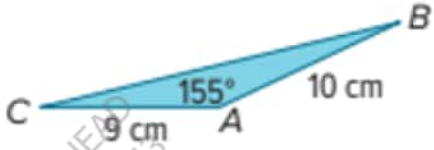


C: Area = (1/2) a b sin C.

a = 18, b = 15, and C = 32°: Area = (1/2)(18)(15) sin 32° = 135 × sin 32°.

Evaluate and round to the nearest tenth: Area ≈ 135 × 0.5299 ≈ 71.5 units².

16.

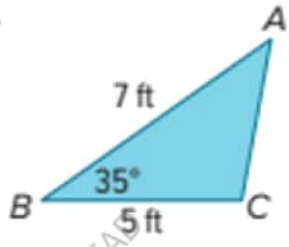


A: Area = (1/2) b c sin A.

b = 9, c = 10, and A = 155°: Area = (1/2)(9)(10) sin 155° = 45 × sin 155°.

Evaluate and round to the nearest tenth: Area ≈ 45 × 0.4226 ≈ 19.0 cm².

17.



B: Area = (1/2) a c sin B.

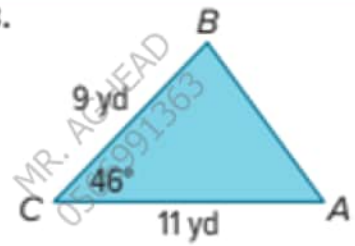
a = 5, c = 7, and B = 35°: Area = (1/2)(5)(7) sin 35° = 17.5 × sin 35°.

Evaluate and round to the nearest tenth: Area ≈ 17.5 × 0.5736 ≈ 10.0 ft².

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18.

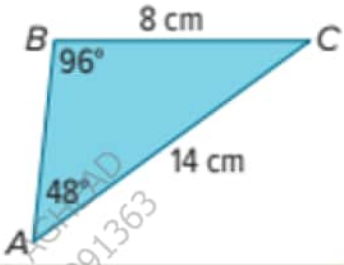


C: Area = (1/2) a b sin C.

a = 9, b = 11, and C = 46°: Area = (1/2)(9)(11) sin 46° = 49.5 × sin 46°.

Evaluate and round to the nearest tenth: Area ≈ 49.5 × 0.7193 ≈ 35.6 yd².

19.

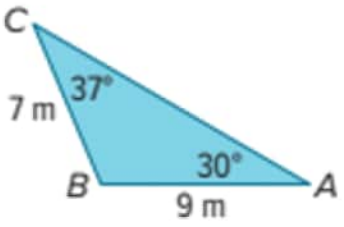


Find the included angle C using the Triangle Angle-Sum Theorem: m∠C = 180° − (48° + 96°) = 36°.

a = 8, b = 14, and C = 36° into Area = (1/2) a b sin C: Area = (1/2)(8)(14) sin 36° = 56 × sin 36°.

Evaluate and round to the nearest tenth: Area ≈ 56 × 0.5878 ≈ 32.9 cm².

20.



Find the included angle B using the Triangle Angle-Sum Theorem: m∠B = 180° − (30° + 37°) = 113°.

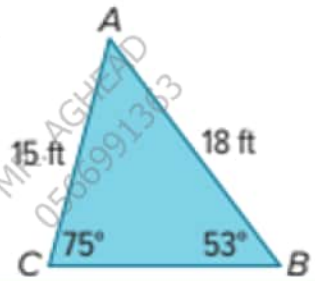
a = 7, c = 9, and B = 113° into Area = (1/2) a c sin B: Area = (1/2)(7)(9) sin 113° = 31.5 × sin 113°.

Evaluate and round to the nearest tenth: Area ≈ 31.5 × 0.9205 ≈ 29.0 m².

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21.



Find the included angle A using the Triangle Angle-Sum Theorem: $m\angle A = 180° - (53° + 75°) = 52°$.

$b = 15$, $c = 18$, and $A = 52°$ into Area = (1/2) b c sin A: Area = $(1/2)(15)(18) \sin 52° = 135 \times \sin 52°$.

Evaluate and round to the nearest tenth: Area $\approx 135 \times 0.7880 \approx 106.4$ ft².

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Polynomials, Factoring Products, Q21:

Factorize binomials that are the difference of squares and Factor perfect square trinomials,

Page(680-681), Exercises(35-41, 51-56)

Free Response Questions - FRQ

Factor each polynomial completely.

35. $8x^2 - 72p^2$

Factor out the Greatest Common Factor (GCF = 8): $8x^2 - 72p^2 = 8(x^2 - 9p^2)$.

Express $x^2 - 9p^2$ as a difference of two squares: $x^2 - (3p)^2$.

Apply $a^2 - b^2 = (a + b)(a - b)$: $8(x + 3p)(x - 3p)$.

36. $20q^2 - 5r^2$

Factor out the Greatest Common Factor (GCF = 5): $20q^2 - 5r^2 = 5(4q^2 - r^2)$.

Express $4q^2 - r^2$ as a difference of two squares: $(2q)^2 - r^2$.

Apply $a^2 - b^2 = (a + b)(a - b)$: $5(2q + r)(2q - r)$.

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37. $32a^2 - 50b^2$

Factor out the Greatest Common Factor (GCF = 2): $32a^2 - 50b^2 = 2(16a^2 - 25b^2)$.

Express $16a^2 - 25b^2$ as a difference of two squares: $(4a)^2 - (5b)^2$.

Apply $a^2 - b^2 = (a + b)(a - b)$: $2(4a + 5b)(4a - 5b)$.

38. $16b^2 - 100$

Factor out the Greatest Common Factor (GCF = 4): $16b^2 - 100 = 4(4b^2 - 25)$.

Express $4b^2 - 25$ as a difference of two squares: $(2b)^2 - 5^2$.

Apply $a^2 - b^2 = (a + b)(a - b)$: $4(2b + 5)(2b - 5)$.

39. $49x^2 - 64y^2$

Check for a common factor (GCF = 1) and write each term as a square: $49x^2 - 64y^2 = (7x)^2 - (8y)^2$.

Apply the difference of squares formula $a^2 - b^2 = (a + b)(a - b)$: $(7x + 8y)(7x - 8y)$.

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40. $3n^4 - 42n^3 + 147n^2$

Factor out the Greatest Common Factor (GCF = $3n^2$): $3n^4 - 42n^3 + 147n^2 = 3n^2(n^2 - 14n + 49)$.

Recognize $n^2 - 14n + 49$ as a perfect square trinomial: $n^2 - 2(n)(7) + 7^2 = (n - 7)^2$.

Write the complete factorization: $3n^2(n - 7)^2$.

41. $8m^3 - 24m^2 + 18m$

Factor out the Greatest Common Factor (GCF = $2m$): $8m^3 - 24m^2 + 18m = 2m(4m^2 - 12m + 9)$.

Recognize $4m^2 - 12m + 9$ as a perfect square trinomial: $(2m)^2 - 2(2m)(3) + 3^2 = (2m - 3)^2$.

Write the complete factorization: $2m(2m - 3)^2$.

Determine whether each trinomial is a perfect square trinomial. Write yes or no. If so, factor it.

51. $9z^2 - 6z + 1$

Check whether the first and last terms are perfect squares: $9z^2 = (3z)^2$ and $1 = 1^2$.

Check whether the middle term equals $-2(3z)(1) = -6z$ (Matches).

Factor using $a^2 - 2ab + b^2 = (a - b)^2$: Yes; $(3z - 1)^2$.

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52. $36x^2 - 60x + 25$

Check whether the first and last terms are perfect squares: $36x^2 = (6x)^2$ and $25 = 5^2$.

Check whether the middle term equals $-2(6x)(5) = -60x$ (Matches).

Factor using $a^2 - 2ab + b^2 = (a - b)^2$: Yes; $(6x - 5)^2$.

53. $49r^2 + 14r + 4$

Check the first and last terms: $49r^2 = (7r)^2$ and $4 = 2^2$.

Check the middle term: for a perfect square trinomial, the middle term must be $2(7r)(2) = 28r$.

Since the given middle term is $14r \neq 28r$, it is not a perfect square trinomial: No.

54. $a^2 + 14a + 49$

Check the first and last terms: $a^2 = (a)^2$ and $49 = 7^2$.

Check the middle term: $2(a)(7) = 14a$ (Matches).

Factor using $a^2 + 2ab + b^2 = (a + b)^2$: Yes; $(a + 7)^2$.

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55. $t^2 - 18t + 81$

Check the first and last terms: $t^2 = (t)^2$ and $81 = 9^2$.
Check the middle term: $-2(t)(9) = -18t$ (Matches).
Factor using $a^2 - 2ab + b^2 = (a - b)^2$: Yes; $(t - 9)^2$.

56. $4c^2 + 2cd + d^2$

Check the first and last terms: $4c^2 = (2c)^2$ and $d^2 = (d)^2$.
Check the middle term: for a perfect square trinomial, the middle term must be $2(2c)(d) = 4cd$.
Since the given middle term is $2cd \neq 4cd$, it is not a perfect square trinomial: No.

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Quadrilaterals, Angles of Polygons, Q22: a) Prove and use the polygon interior angles sum theorem / b) Find and use the sum of the measures of the exterior angles of a polygon, Page(64), Exercises(9-18)

Free Response Questions - FRQ

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

9. 144°

Find the measure of each exterior angle (supplementary to the interior angle): Exterior angle = 180° – 144° = 36°.

Use the Polygon Exterior Angles Theorem (sum of exterior angles = 360°): 36° × n = 360°.

Solve for n: n = 360° / 36° = 10 sides.

10. 156°

Find the measure of each exterior angle: Exterior angle = 180° – 156° = 24°.

Use the Polygon Exterior Angles Theorem: 24° × n = 360°.

Solve for n: n = 360° / 24° = 15 sides.

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11. 160°

Find the measure of each exterior angle: Exterior angle = 180° – 160° = 20°.
Use the Polygon Exterior Angles Theorem: 20° × n = 360°.
Solve for n: n = 360° / 20° = 18 sides.

12. 108°

Find the measure of each exterior angle: Exterior angle = 180° – 108° = 72°.
Use the Polygon Exterior Angles Theorem: 72° × n = 360°.
Solve for n: n = 360° / 72° = 5 sides.

13. 120°

Find the measure of each exterior angle: Exterior angle = 180° – 120° = 60°.
Use the Polygon Exterior Angles Theorem: 60° × n = 360°.
Solve for n: n = 360° / 60° = 6 sides.

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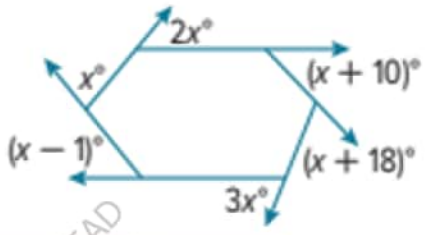
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14. 150°

Find the measure of each exterior angle: Exterior angle = 180° – 150° = 30°.
Use the Polygon Exterior Angles Theorem: 30° × n = 360°.
Solve for n: n = 360° / 30° = 12 sides.

Find the value of x in each diagram

15.

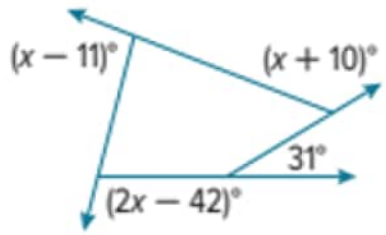


By the Polygon Exterior Angles Theorem, the sum of the exterior angles of any convex polygon is 360°.

Set up the equation: 2x + (x + 10) + (x + 18) + 3x + (x – 1) + x = 360.

Combine like terms and solve: 9x + 27 = 360 ⇒ 9x = 333 ⇒ x = 37.

16.



By the Polygon Exterior Angles Theorem, the sum of the exterior angles is 360°.

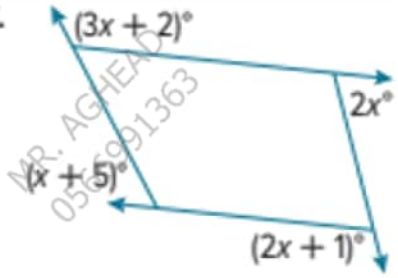
Set up the equation: (x – 11) + (x + 10) + 31 + (2x – 42) = 360.

Combine like terms and solve: 4x – 12 = 360 ⇒ 4x = 372 ⇒ x = 93.

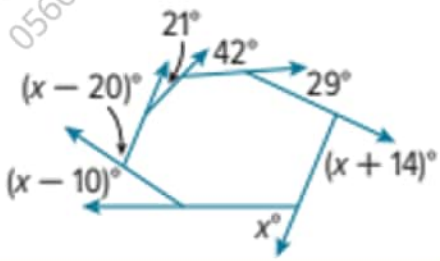
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17. 

By the Polygon Exterior Angles Theorem, the sum of the exterior angles is 360°.
Set up the equation: (3x + 2) + 2x + (2x + 1) + (x + 5) = 360.
Combine like terms and solve: 8x + 8 = 360 ⇒ 8x = 352 ⇒ x = 44.

18. 

By the Polygon Exterior Angles Theorem, the sum of the exterior angles is 360°.
Set up the equation: 21 + 42 + 29 + (x + 14) + x + (x – 10) + (x – 20) = 360.
Combine like terms and solve: 4x + 76 = 360 ⇒ 4x = 284 ⇒ x = 71.

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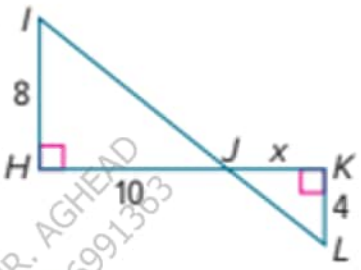
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Similarity, Similar Triangles: SSS and SAS Similarity, Q23: Use similar triangles to solve problems, Page(139), Exercises(5-11)

Free Response Questions - FRQ

Identify the similar triangles. Then find the value of x.

5.

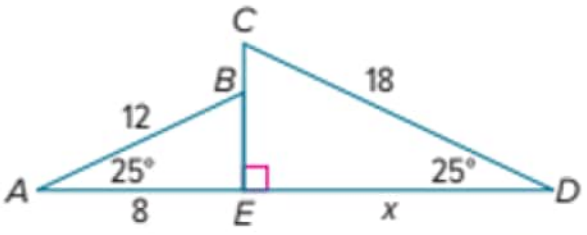


Since ∠H ≅ ∠K (both are right angles) and ∠IJH ≅ ∠LJK (vertical angles), △IHJ ~ △LKJ by AA Similarity.

Write the proportion of corresponding sides: KJ / HJ = LK / IH ⇒ x / 10 = 4 / 8.

Solve for x: 8x = 40 ⇒ x = 5.

6.



Since ∠AEB ≅ ∠DEC (90°) and ∠A ≅ ∠D (25°), △AEB ~ △DEC by AA Similarity.

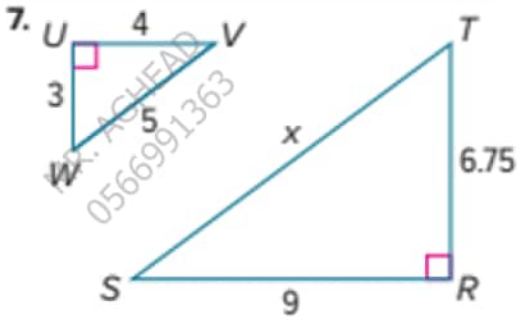
Write the proportion of corresponding sides: DE / AE = DC / AB ⇒ x / 8 = 18 / 12.

Solve for x: 12x = 144 ⇒ x = 12.

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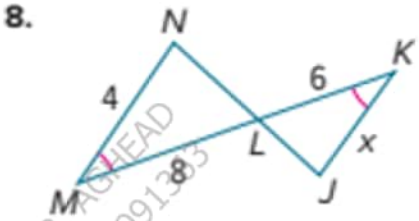
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7. 

Compare the ratios of the legs: TR / WU = 6.75 / 3 = 2.25 and RS / UV = 9 / 4 = 2.25, with included right angles ∠U ≅ ∠R. Thus △WUV ~ △TRS by SAS Similarity.

Set up the ratio for the hypotenuses: TS / WV = 2.25 ⇒ x / 5 = 2.25.

Solve for x: x = 5 × 2.25 = 11.25.

8. 

Since ∠M ≅ ∠K and ∠MLN ≅ ∠KLJ (vertical angles), △MNL ~ △KJL by AA Similarity.

Write the proportion of corresponding sides: KJ / MN = KL / ML ⇒ x / 4 = 6 / 8.

Solve for x: 8x = 24 ⇒ x = 3.

The skeleton of a roof is shown. Find the value of x (ED) such that triangles DEF and FBC in the outline of the roof are similar, given DF = 10 ft, FC = 16 ft, and BF = 8 ft.

Since △DEF ~ △FBC, the lengths of corresponding sides are proportional: ED / BF = DF / FC.

Substitute ED = x, BF = 8, DF = 10, and FC = 16: x / 8 = 10 / 16.

Cross-multiply and solve for x: 16x = 80 ⇒ x = 5 ft.

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A radio tower casts an 8-foot-long shadow at the same time that a vertical yardstick (3 feet or 36 inches) 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?

Convert the yardstick height to inches: 1 yard = 3 feet = 36 inches, with shadow = 0.5 inch.

Set up the similarity proportion (Height / Shadow): h / 8 ft = 36 in. / 0.5 in.

Solve for h: h / 8 = 72 ⇒ h = 8 × 72 = 576 feet.

The two sailboats shown are participating in a regatta. If the right-triangular sails are similar, with the first sail having vertical leg 168.5 in. and hypotenuse 220 in., and the second sail having hypotenuse 264 in. and vertical leg x in., what is the value of x?

Set up the proportion of corresponding sides of the similar right triangles: x / 168.5 = 264 / 220.

Simplify the scale factor: 264 / 220 = 1.2.

Multiply to find x: x = 168.5 × 1.2 = 202.2 in.

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Right Triangles and Trigonometry, Coordinates in Space, Q24: Distance and midpoint formulas in space, Page(177-178), Exercises(13-18, 19-24)

Free Response Questions - FRQ

Determine the coordinates of the midpoint M of the segment joining each pair of points.

13. $K(-2, -4, -4)$ and $L(4, 2, 0)$

Write the 3D Midpoint Formula: $M = ((x_1 + x_2)/2, (y_1 + y_2)/2, (z_1 + z_2)/2)$.

Substitute $K(-2, -4, -4)$ and $L(4, 2, 0)$: $M = ((-2 + 4)/2, (-4 + 2)/2, (-4 + 0)/2)$.

Simplify each coordinate: $M = (2/2, -2/2, -4/2) = (1, -1, -2)$.

14. $W(-1, -3, -6)$ and $Z(-1, 5, 10)$

Write the 3D Midpoint Formula: $M = ((x_1 + x_2)/2, (y_1 + y_2)/2, (z_1 + z_2)/2)$.

Substitute $W(-1, -3, -6)$ and $Z(-1, 5, 10)$: $M = ((-1 + (-1))/2, (-3 + 5)/2, (-6 + 10)/2)$.

Simplify each coordinate: $M = (-2/2, 2/2, 4/2) = (-1, 1, 2)$.

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15. $R(3, 3, 4)$ and $V(5, 4, 13)$

Write the 3D Midpoint Formula: $M = ((x_1 + x_2)/2, (y_1 + y_2)/2, (z_1 + z_2)/2)$.

Substitute R(3, 3, 4) and V(5, 4, 13): $M = ((3 + 5)/2, (3 + 4)/2, (4 + 13)/2)$.

Simplify each coordinate: $M = (8/2, 7/2, 17/2) = (4, 3.5, 8.5)$.

16. $A(4, 6, -8)$ and $B(0, 0, 0)$

Write the 3D Midpoint Formula: $M = ((x_1 + x_2)/2, (y_1 + y_2)/2, (z_1 + z_2)/2)$.

Substitute A(4, 6, –8) and B(0, 0, 0): $M = ((4 + 0)/2, (6 + 0)/2, (-8 + 0)/2)$.

Simplify each coordinate: $M = (2, 3, -4)$.

17. $C(8, 7, 11)$ and $D(2, 1, 8)$

Write the 3D Midpoint Formula: $M = ((x_1 + x_2)/2, (y_1 + y_2)/2, (z_1 + z_2)/2)$.

Substitute C(8, 7, 11) and D(2, 1, 8): $M = ((8 + 2)/2, (7 + 1)/2, (11 + 8)/2)$.

Simplify each coordinate: $M = (10/2, 8/2, 19/2) = (5, 4, 9.5)$.

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18. $T(-1, -7, 9)$ and $U(5, -1, -6)$

Write the 3D Midpoint Formula: $M = ((x_1 + x_2)/2, (y_1 + y_2)/2, (z_1 + z_2)/2)$.

Substitute $T(-1, -7, 9)$ and $U(5, -1, -6)$: $M = ((-1 + 5)/2, (-7 + (-1))/2, (9 + (-6))/2)$.

Simplify each coordinate: $M = (4/2, -8/2, 3/2) = (2, -4, 1.5)$.

Determine the distance between each pair of points. Then determine the coordinates of the midpoint M of the segment joining the pair of points.

19. $P(-5, -2, -1)$ and $Q(-1, 0, 3)$

Use the 3D Distance Formula $d = \sqrt{((x_2 - x_1)^2 + (y_2 - y_1)^2 + (z_2 - z_1)^2)}$: $d = \sqrt{((-1 - (-5))^2 + (0 - (-2))^2 + (3 - (-1))^2)} = \sqrt{(16 + 4 + 16)} = \sqrt{36} = 6$.

Use the 3D Midpoint Formula: $M = ((-5 - 1)/2, (-2 + 0)/2, (-1 + 3)/2) = (-3, -1, 1)$.

20. $J(1, 1, 1)$ and $K(-1, -1, -1)$

Calculate distance: $d = \sqrt{((-1 - 1)^2 + (-1 - 1)^2 + (-1 - 1)^2)} = \sqrt{(4 + 4 + 4)} = \sqrt{12} = 2\sqrt{3} \approx 3.5$.

Calculate midpoint: $M = ((1 - 1)/2, (1 - 1)/2, (1 - 1)/2) = (0, 0, 0)$.

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21. $F\left(\frac{3}{5}, 0, \frac{4}{5}\right)$ and $G(0, 3, 0)$

Calculate distance: d = √((0 – 3/5)² + (3 – 0)² + (0 – 4/5)²) = √(9/25 + 9 + 16/25) = √(1 + 9) = √10 ≈ 3.2.

Calculate midpoint: M = ((3/5 + 0)/2, (0 + 3)/2, (4/5 + 0)/2) = (3/10, 3/2, 2/5).

22. $G(1, -1, 6)$ and $H\left(\frac{1}{5}, -\frac{2}{5}, 2\right)$

Calculate distance: d = √((1/5 – 1)² + (–2/5 – (–1))² + (2 – 6)²) = √((–4/5)² + (3/5)² + (–4)²) = √(16/25 + 9/25 + 16) = √(1 + 16) = √17 ≈ 4.1.

Calculate midpoint: M = ((1 + 1/5)/2, (–1 – 2/5)/2, (6 + 2)/2) = (3/5, –7/10, 4).

23. $B(\sqrt{3}, 2, 2\sqrt{2})$ and $C(-2\sqrt{3}, 4, 4\sqrt{2})$

Calculate distance: d = √((–2√3 – √3)² + (4 – 2)² + (4√2 – 2√2)²) = √((–3√3)² + 2² + (2√2)²) = √(27 + 4 + 8) = √39 ≈ 6.2.

Calculate midpoint: M = ((√3 – 2√3)/2, (2 + 4)/2, (2√2 + 4√2)/2) = (–√3/2, 3, 3√2).

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24. $S(6\sqrt{3}, 4, 4\sqrt{2})$ and $T(4\sqrt{3}, 5, \sqrt{2})$

Calculate distance: $d = \sqrt{((4\sqrt{3} - 6\sqrt{3})^2 + (5 - 4)^2 + (\sqrt{2} - 4\sqrt{2})^2)} = \sqrt{((-2\sqrt{3})^2 + 1^2 + (-3\sqrt{2})^2)} = \sqrt{(12 + 1 + 18)} = \sqrt{31} \approx 5.6$.

Calculate midpoint: $M = ((6\sqrt{3} + 4\sqrt{3})/2, (4 + 5)/2, (4\sqrt{2} + \sqrt{2})/2) = (5\sqrt{3}, 4.5, 5\sqrt{2}/2)$.

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Right Triangles and Trigonometry, The Law of Sines, Q25: Determine whether three given measures of a triangle define 0, 1, or 2 triangles by using the Law of Sines, Page(208), Exercises(15-26)

Free Response Questions - FRQ

Determine whether each triangle has no solution, one solution, or two solutions. Then, solve the triangle. Round side lengths to the nearest tenth and angle measures to the nearest degree.

15. $m\angle A = 50°, a = 34, b = 40$

Since ∠A = 50° is acute and a < b (34 < 40), compute altitude h = b sin A = 40 sin 50° ≈ 30.6.

(Case 1 - Acute ∠B): sin B = 40 sin 50° / 34 ≈ 0.9012 ⇒ m∠B ≈ 64°, m∠C = 180° – (50° + 64°) = 66°, and c = 34 sin 66° / sin 50° ≈ 40.6.

(Case 2 - Obtuse ∠B): m∠B ≈ 180° – 64° = 116°, m∠C = 180° – (50° + 116°) = 14°, and c = 34 sin 14° / sin 50° ≈ 10.7.

16. $m\angle A = 24°, a = 3, b = 8$

Since ∠A = 24° is acute and a < b (3 < 8), compute altitude h = b sin A = 8 sin 24° ≈ 3.25.

Compare a and h: since a < h (3 < 3.25), side a is too short to reach the opposite side.

Conclude that no triangle is formed (No solution).

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17. $m\angle A = 125°, a = 22, b = 15$

Since ∠A = 125° is obtuse and a > b (22 > 15), there is exactly One solution.

Use the Law of Sines to find ∠B: sin B = 15 sin 125° / 22 ≈ 0.5585 ⇒ m∠B ≈ 34°.

Find ∠C and side c: m∠C = 180° – (125° + 34°) = 21°, and c = 22 sin 21° / sin 125° ≈ 9.6.

18. $m\angle A = 30°, a = 1, b = 4$

Since ∠A = 30° is acute and a < b (1 < 4), compute altitude h = b sin A = 4 sin 30° = 2.

Compare a and h: since a < h (1 < 2), side a cannot reach the opposite side.

Conclude that there is No solution.

19. $m\angle A = 30°, a = 2, b = 4$

Since ∠A = 30° is acute and a < b (2 < 4), compute altitude h = b sin A = 4 sin 30° = 2.

Since a = h (2 = 2), there is exactly One right-triangle solution with m∠B = 90°.

Find ∠C and side c: m∠C = 180° – (30° + 90°) = 60°, and c = 4 cos 30° = 2√3 ≈ 3.5.

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20. $m\angle A = 30^\circ, a = 3, b = 4$

Compute altitude h = b sin A = 4 sin 30° = 2. Since h < a < b (2 < 3 < 4), there are Two solutions.

(Case 1 - Acute ∠B): sin B = 4 sin 30° / 3 = 2/3 ⇒ m∠B ≈ 42°, m∠C = 180° – (30° + 42°) = 108°, c = 3 sin 108° / sin 30° ≈ 5.7.

(Case 2 - Obtuse ∠B): m∠B ≈ 180° – 42° = 138°, m∠C = 180° – (30° + 138°) = 12°, c = 3 sin 12° / sin 30° ≈ 1.2.

21. $m\angle A = 38^\circ, a = 10, b = 9$

Since ∠A = 38° is acute and a ≥ b (10 > 9), there is One solution.

Use the Law of Sines: sin B = 9 sin 38° / 10 ≈ 0.5541 ⇒ m∠B ≈ 34°.

Find ∠C and side c: m∠C = 180° – (38° + 34°) = 108°, and c = 10 sin 108° / sin 38° ≈ 15.4.

22. $m\angle A = 78^\circ, a = 8, b = 5$

Since ∠A = 78° is acute and a ≥ b (8 > 5), there is One solution.

Use the Law of Sines: sin B = 5 sin 78° / 8 ≈ 0.6113 ⇒ m∠B ≈ 38°.

Find ∠C and side c: m∠C = 180° – (78° + 38°) = 64°, and c = 8 sin 64° / sin 78° ≈ 7.3.

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23. $m\angle A = 133^\circ, a = 9, b = 7$

Since ∠A = 133° is obtuse and a > b (9 > 7), there is One solution.

Use the Law of Sines: sin B = 7 sin 133° / 9 ≈ 0.5689 ⇒ m∠B ≈ 35°.

Find ∠C and side c: m∠C = 180° – (133° + 35°) = 12°, and c = 9 sin 12° / sin 133° ≈ 2.6.

24. $m\angle A = 127^\circ, a = 2, b = 6$

Examine angle A = 127° (obtuse) and compare side a = 2 with side b = 6.

In any triangle, the longest side must be opposite the largest angle. Since ∠A is obtuse, side a must be greater than b.

Because a ≤ b (2 < 6), no triangle can exist: No solution.

25. $m\angle A = 109^\circ, a = 24, b = 13$

Since ∠A = 109° is obtuse and a > b (24 > 13), there is One solution.

Use the Law of Sines: sin B = 13 sin 109° / 24 ≈ 0.5122 ⇒ m∠B ≈ 31°.

Find ∠C and side c: m∠C = 180° – (109° + 31°) = 40°, and c = 24 sin 40° / sin 109° ≈ 16.3.

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26. $m\angle A = 48°$, $a = 11$, and $b = 16$

Since $\angle A = 48°$ is acute and $a < b$ $(11 < 16)$, compute altitude $h = b \sin A = 16 \sin 48° \approx 11.89$.

Compare a and h: since $a < h$ $(11 < 11.89)$, side a is too short to reach the opposite side.

Conclude that there is No solution.

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