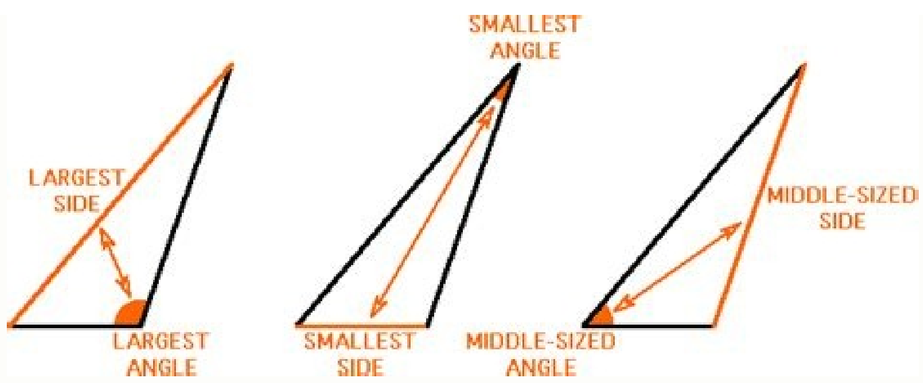
Practice a angle relationships in triangles answers



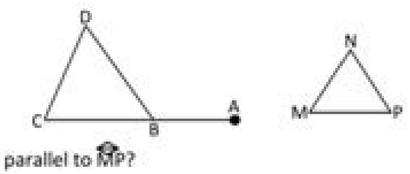
4-3 Angle Relationships in Triangles

Objectives: G.CO.10: Prove theorems about triangles.

For the board: You will be able to find the measures of interior and exterior angles of triangles and apply these theorems.

Bell Work 4.3:

1. Find the m<DBA, if m<DBC = 30°, m<C = 70°, and m<D = 80°.
2. What is the complement of an angle with measure 17°?
3. How many lines can be drawn through N parallel to MP?



Anticipatory Set:

Experiment: Given a triangle, tear off the 3 corners. Arrange them so that they are adjacent angles. What do you notice about the sum of these three angles?

They make a straight angle and thus add to equal 180°

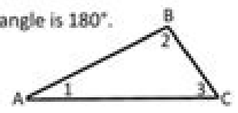
Instruction:

The Triangle Sum Theorem

The sum of the measures of the interior angles of a triangle is 180°.

Given: Triangle ABC

Conclusion: m<1 + m<2 + m<3 = 180°



Open the book to page 232 and read example 1.

Practice 1: Use the diagram drawn from to find the indicated angle measures.

a. m<XYZ

62 + 40 = 102

180 – 102 = 78°

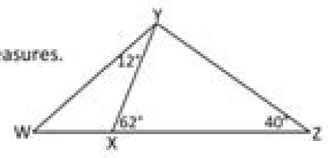
b. m<YXW

180 – 62 = 118°

c. m<YWX

12 + 118 = 130

180 – 130 = 50°



Practice: Find the measure of each angle of ΔABC.

3x + 2x + 17 + 33 = 180

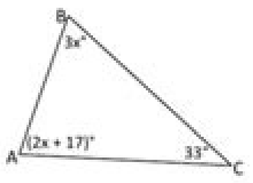
5x + 50 = 180

5x = 130

x = 26

m<A = 2(26) + 17 = 69°

m<B = 3(26) = 78°



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Angle Relationships Date_____ Period____

Name the relationship: complementary, supplementary, vertical, or adjacent.

1)

2)

3)

4)

5)

6)

Name the relationship: alternate interior, corresponding, or alternate exterior.

7)

8)

9)

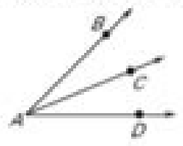
10)

Geometry
Section 1.5

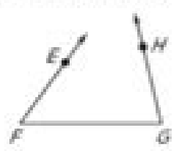
Name:_____Date:_____
Angle Pair Relationships Practice Worksheet

Are the indicated angles *adjacent*?

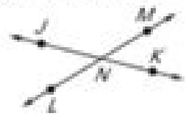
1._____ ∠*BAC* and ∠*CAD*



2._____ ∠*EFG* and ∠*HGF*



3._____ ∠*JNM* and ∠*LNK*



∠ 1 and ∠ 2 are *complementary* angles. Given the measure of ∠1, find *m*∠2.

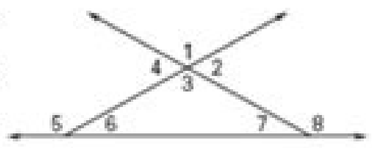
6. *m*∠1=52°, *m*∠2 = _____ 7. *m*∠1=76°, *m*∠2 = _____ 8. *m*∠1=19°, *m*∠2 = _____

∠ 1 and ∠ 2 are *supplementary* angles. Given the measure of ∠1, find *m*∠2.

9. *m*∠1=52°, *m*∠2 = _____ 10. *m*∠1=76°, *m*∠2 = _____ 11. *m*∠1=19°, *m*∠2 = _____

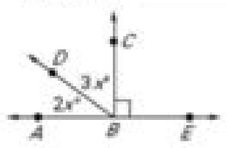
Using the diagram, tell whether the angles are *vertical angles*, a *linear pair*, or *neither*.

12._____ ∠1 and ∠2
13._____ ∠1 and ∠3
14._____ ∠1 and ∠4
15._____ ∠1 and ∠5
16._____ ∠1 and ∠6
17._____ ∠1 and ∠7
18._____ ∠1 and ∠8
19._____ ∠2 and ∠4

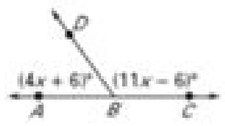


Use the diagrams to find the indicated measurements.

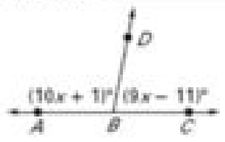
20. x = _____
m∠ *ABD* = _____
m∠ *DBC* = _____



21. x = _____
m∠ *ABD* = _____
m∠ *DBC* = _____



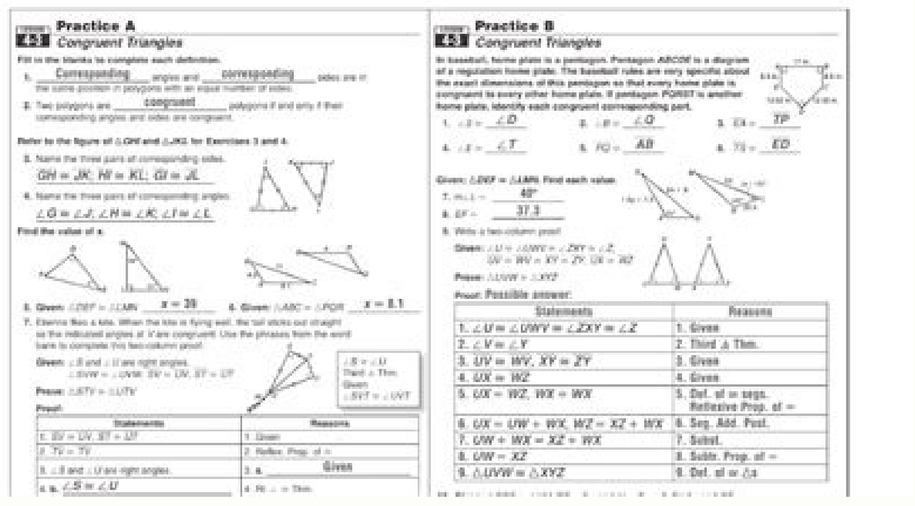
22. x = _____
m∠ *ABD* = _____
m∠ *DBC* = _____



Given: *m*∠*A* = (4x – 2)° and *m*∠*B* = (11x + 17)°

23. Find *x* if the angles are *complementary*.

24. Find *x* if the angles are *supplementary*.


Practice A
4.5 Congruent Triangles
Fill in the blanks to complete each definition.
1. Corresponding angles and corresponding sides are in the same position in polygons with an equal number of sides.
2. Two polygons are congruent polygons if and only if their corresponding angles and sides are congruent.
Refer to the figure of △GHI and △JKL for Exercises 3 and 4.
3. Name the three pairs of corresponding sides.
GH ≅ JK, HI ≅ KL, GI ≅ JL
4. Name the three pairs of corresponding angles.
∠G ≅ ∠J, ∠H ≅ ∠K, ∠I ≅ ∠L
Find the value of x.
5. Given: △DEF ≅ △LMN x = 20
6. Given: △ABC ≅ △PQR x = 8.1
7. Deanna flies a kite. When the kite is flying well, the tail sticks out straight so the indicated angles at A are congruent. Use the phrases from the word bank to complete this two-column proof.
Given: △S and △U are right angles.
△SVW ≅ △UVM, SV ≅ UV, ST ≅ UT
Prove: △STV ≅ △UTV
Proof:
∠S ≅ ∠U
Def. ≅ Thm.
Given
△SVT ≅ △UVT
Statements
Reasons
1. SV ≅ UV, ST ≅ UT
1. Given
2. TV ≅ TV
2. Reflex. Prop. of ≅
3. ∠S and ∠U are right angles.
3. a. Given
4. a. ∠S ≅ ∠U
4. Hl. ≅ Thm.
Practice B
4.5 Congruent Triangles
In baseball, home plate is a pentagon. Pentagon ABCDE is a diagram of a regulation home plate. The baseball rules are very specific about the exact dimensions of this pentagon so that every home plate is congruent to every other home plate. If pentagon PQRST is another home plate, identify each congruent corresponding part.
1. ∠B ≅ ∠Q
2. ∠E ≅ ∠O
3. DA ≅ TP
4. ∠T ≅ ∠T
5. RQ ≅ AB
6. TS ≅ ED
Given: △DEF ≅ △LMN. Find each value.
7. m∠L = 40°
8. EF = 37.3
9. Write a two-column proof.
Given: △U ≅ △WWZ ≅ △ZXY ≅ △Z, UV ≅ WV ≅ XY ≅ ZY, UX ≅ WZ
Prove: △UVW ≅ △XYZ
Proof: Possible answer:
Statements
Reasons
1. ∠U ≅ ∠UWV ≅ ∠ZXY ≅ ∠Z
1. Given
2. ∠V ≅ ∠Y
2. Third ∠ Thm.
3. UV ≅ WV, XY ≅ ZY
3. Given
4. UX ≅ WZ
4. Given
5. UX ≅ WZ, WX ≅ WX
5. Def. of ≅ segs. Reflexive Prop. of ≅
6. UX ≅ UW + WX, WZ ≅ XZ + WX
6. Seg. Add. Post.
7. UW + WX ≅ XZ ≅ WX
7. Subst.
8. UW ≅ XZ
8. Subtr. Prop. of ≅
9. △UVW ≅ △XYZ
9. Def. of ≅ for △s

Lesson 4-3 practice a angle relationships in triangles answers.

Answer: ∠ VWZ Explanation: ∠UVY and ∠ VWZ are a pair of corresponding angles. When two lines are crossed by Transversal the angles in matching corners are called corresponding angles. Question 2. ∠WVY and ∠VWT are _____ angles. _____ Answer: ∠WVY and ∠VWT are alternate interior angles. Alternate Interior Angles are a pair of angles on the inner side of each of those two lines but on opposite sides of the transversal. Explanation: ∠WVY and ∠VWT are alternate interior angles. Alternate Interior Angles are a pair of angles on the inner side of each of those two lines but on opposite sides of the transversal. Question 3. Find m∠SVW. _____ ° Answer: 80º Explanation: ∠SVW and ∠VWT are same sider interior angles. Therefore, m∠SVW + m∠VWT = 180º 4x º +5x º = 180º 9x = 180º x = 180/9 x = 20 m∠VWT = 5x º = (5.20)º = 100º Question 4. Find m∠VWT. _____ ° Answer: 100º Explanation: ∠SVW and ∠VWT are same sider interior angles. Therefore, m∠SVW + m∠VWT = 180º 4x º +5x º = 180º 9x = 180º x = 180/9 x = 20 m∠VWT = 5x º = (5.20)º = 100º Question 5. Vocabulary When two parallel lines are cut by a transversal, _____ angles are supplementary. _____ Answer: If two parallel lines are cut by a transversal, then the pairs of alternate exterior angles are congruent. If two parallel lines are cut by a transversal, then the pairs of consecutive interior angles are supplementary. ESSENTIAL QUESTION CHECK-IN Question 6. What can you conclude about the interior angles formed when two parallel lines are cut by a transversal? Type below: _____ Answer: Alternate interior angles are congruent; same-side interior angles are supplementary. Explanation: When two parallel lines are cut by a transversal, the interior angles will be the angles between the two parallel lines. Alternate interior angles will be on opposite sides of the transversal; the measures of these angles are the same. Same-side interior angles will be on the same side of the transversal; the measures of these angles will be supplementary, adding up to 180 degrees. 11.1 Independent Practice – Parallel Lines Cut by a Transversal – Page No. 351 Vocabulary Use the figure for Exercises 7–10. Question 7. Name all pairs of corresponding angles. Type below: _____ Answer: ∠1 and ∠5 ∠3 and ∠7 ∠2 and ∠6 ∠4 and ∠8 Explanation: Corresponding angles are ∠1 and ∠5 ∠3 and ∠7 ∠2 and ∠6 ∠4 and ∠8 Question 8. Name both pairs of alternate exterior angles. Type below: _____ Answer: ∠1 and ∠8 ∠2 and ∠7 Explanation: Alternate exterior angles ∠1 and ∠8 ∠2 and ∠7 Question 9. Name the relationship between ∠ 3 and ∠6. Type below: _____ Answer: alternate interior angles Explanation: ∠3 and ∠6 are alternate interior angles. Alternate Interior Angles are a pair of angles on the inner side of each of those two lines but on opposite sides of the transversal. Question 10. Name the relationship between ∠4 and ∠6. Type below: _____ Answer: same-side interior angles Explanation: ∠4 and ∠6 are same-side interior angles. Find each angle measure. Question 11. m∠AGE when m∠FHD = 30° _____ ° Answer: m∠AGE = 30° Explanation: ∠AGE and ∠FHD are alternate exterior angles. Therefore, m∠AGE = m∠FHD = 30° m∠AGE = 30° Question 12. m∠AGH when m∠CHF = 150° _____ ° Answer: 150° Explanation: ∠AGH and ∠CHF are corresponding angles. Therefore, m∠AGH = m∠CHF = 150° m∠AGH = 150° Question 13. m∠CHF when m∠BGE = 110° _____ ° Answer: 110° Explanation: ∠CHF and ∠BGE are alternate exterior angles. Therefore, m∠CHF = m∠BGE = 110° m∠CHF = 110° Question 14. m∠CHG when m∠HGA = 120° _____ ° Answer: m∠CHG = 60º Explanation: ∠CHF and ∠HGA are same-side interior angles. m∠CHG + m∠HGA = 180° m∠CHG + 120° = 180° m∠CHG = 180 – 120 = 60 m∠CHG = 60º Question 15. m∠BGH _____ ° Answer: 78º Explanation: ∠BGH and ∠GHD are same-side interior angles. So, ∠BGH + ∠GHD = 180º 3x + (2x + 50)º = 180º 5x = 180º – 50º = 130º x = 130/5 = 26º ∠BGH = 3xº = 3 × 26º = 78º ∠GHD = (2x + 50) += (2 × 26 + 50) = 102º Question 16. m∠GHD _____ ° Answer: 102º Explanation: ∠BGH and ∠GHD are same-side interior angles. So, ∠BGH + ∠GHD = 180º 3x + (2x + 50)º = 180º 5x = 180º – 50º = 130º x = 130/5 = 26º ∠BGH = 3xº = 3 × 26º = 78º ∠GHD = (2x + 50) += (2 × 26 + 50) = 102º Question 17. The Cross Country Bike Trail follows a straight line where it crosses 350th and 360th Streets. The two streets are parallel to each other. What is the measure of the larger angle formed at the intersection of the bike trail and 360th Street? Explain. _____ ° Answer: The larger angle formed at the intersection of the bike trail and 360th Street is 132º Explanation: The larger angle formed at the intersection of the bike trail and 360th Street is the angle 5 in our schema. ∠5 and ∠3 are same-side interior angles. Therefore, m∠5 + m∠3 = 180º m∠5 + 48º = 180º m∠5 = 180º – 48º m∠5 = 132º Question 18. Critical Thinking How many different angle measures would there be? _____ different angles _____ different angle measures Answer: 12 different angles 2 different angle measures Explanation: There are 12 different angles formed by a transversal intersecting three parallel lines. There are 2 different angle measures: m∠1 = m∠4 = m∠5 = m∠8 = m∠9 = m∠12 m∠2 = m∠3 = m∠6 = m∠7 = m∠10 = m∠11 Parallel Lines Cut by a Transversal – Page No. 352 Question 19. Communicate Mathematical Ideas In the diagram at the right, suppose m∠6 = 125°. Explain how to find the measures of each of the other seven numbered angles. Type below: _____ Answer: m∠2 = m∠6 = 125º because ∠2 and ∠6 are corresponding angles. m∠3 = m∠2 = 125º because ∠3 and ∠2 are vertical angles. m∠7 = m∠3 = 125º because ∠7 and ∠3 are corresponding angles. ∠4 and ∠6 are same-side interior angles. Therefore, m∠4 + m∠6 = 180º m∠4 + 125º = 180º m∠4 = 180º – 125º m∠4 = 55º m∠8 = m∠4 = 55º because ∠8 and ∠4 are corresponding angles. m∠1 = m∠4 = 55º because ∠1 and ∠4 are vertical angles. m∠5 = m∠1 = 55º because ∠5 and ∠1 are corresponding angles. FOCUS ON HIGHER ORDER THINKING Question 20. Draw Conclusions In a diagram showing two parallel lines cut by a transversal, the measures of two same-side interior angles are both given as 3x°. Without writing and solving an equation, can you determine the measures of both angles? Explain. Then write and solve an equation to find the measures. Answer: m∠1 and m∠2 are same-side interior angles is 180º Therefore, m∠1 + m∠2 = 180º 3x + 3x = 180º 6x = 180º x = 180/6 = 30 m∠1 = m∠2 = 3x = 3(30) = 90º Question 21. Make a Conjecture Draw two parallel lines and a transversal. Choose one of the eight angles that are formed. How many of the other seven angles are congruent to the angle you selected? How many of the other seven angles are supplementary to your angle? Will your answer change if you select a different angle? Type below: _____ Answer: We have to select ∠a form of eight angles that are formed. There are two other angles that are congruent to the angle ∠a. Two other angles are ∠e and ∠g. There are no supplementary to ∠a. If we select a different angle then the answer will also change. Question 22. Critique Reasoning In the diagram at the right, ∠2, ∠3, ∠5, and∠8 are all congruent, and∠1, ∠4, ∠6, and ∠7 are all congruent. Aiden says that this is enough information to conclude that the diagram shows two parallel lines cut by a transversal. Is he correct? Justify your answer. _____ Answer: This is not enough information to conclude that the diagram shows two parallel lines cut by a transversal. Because ∠2 and ∠3 are same-side interior angles. But ∠5 and ∠8 are not congruent with each other. And ∠6 and ∠7 are same-side interior angles. But ∠1 and ∠4 are not congruent with each other. Guided Practice – Angle Theorems for Triangles – Page No. 358 Find each missing angle measure. Question 1. m∠M = _____ ° Answer: m∠M = 71º Explanation: From the Triangle Sum Theorem, m∠L + m∠N + m∠M = 180º 78º + 31º + m∠M = 180º 109º + m∠M = 180º m∠M = 180º – 109º m∠M = 71º Question 2. m∠Q = _____ ° Answer: m∠Q = 30º Explanation: From the Triangle Sum Theorem, m∠Q + m∠S + m∠R = 180º m∠Q + 24º + 126º = 180º m∠Q + 150º = 180º m∠Q = 180º – 150º m∠Q = 30º Use the Triangle Sum Theorem to find the measure of each angle in degrees. Question 3. m∠T = _____ ° m∠V = _____ ° m∠U = _____ ° Answer: m∠T = 88° m∠V = 63° m∠U = 29° Explanation: From the Triangle Sum Theorem, m∠U + m∠T + m∠V = 180º (2x + 5)º + (7x + 4)º + (5x + 3)º = 180º 2xº + 5º + 7xº + 4º + 5xº + 3º = 180º 14xº + 12º = 180º 14xº = 168º x = 168/14 = 12 Substitute x value to find the angles m∠U = (2x + 5)º = ((2 . 12) + 5)º = 29º m∠U = 29º m∠T = (7x + 4)º = ((7 . 12) + 4)º = 88º m∠T = 88º m∠V = (5x + 3)º = ((5 . 12) + 3)º = 63º m∠V = 63º Question 4. m∠X = _____ ° m∠Y = _____ ° m∠Z = _____ ° Answer: m∠X = 90° m∠Y = 45 ° m∠Z = 45° Explanation: From the Triangle Sum Theorem, m∠X + m∠Y + m∠Z = 180º nº + (1/2 . nº) + (1/2 . nº)º = 180º 2nº = 180º n = 90 Substitute n values to find the angles m∠X = nº = 90º m∠X = 90º m∠Y = 45º m∠Z = (1/2 . nº) = (1/2 . 90)º = 45º m∠Y = 45º m∠Z = 45º Use the Exterior Angle Theorem to find the measure of each angle in degrees. Question 5. m∠C = _____ ° m∠D = _____ ° Answer: m∠C = 40° m∠D = 76° Explanation: Given m∠C = 4y°, m∠D = (7y + 6)°, m∠E = 116° By using exterior angle theorem, ∠DEC + ∠DEF = 180° ∠DEC + 116° = 180° ∠E = ∠DEC = 180° – 116° = 64° The sum of the angles of a traingle = 180° ∠C +∠D + ∠E = 180° 4y° + (7y + 6)°+ 64° = 180° 11y° + 70° = 180° 11y° = 180° – 70° = 110° y = 10 ∠C = 4y° = 4. 10 = 40° ∠D = (7y + 6)° = ((7 . 10) + 6)° = (70 + 6)° = 76° Question 6. m∠L = _____ ° m∠M = _____ ° Answer: m∠L = 129° m∠M = 32° Explanation: Given that m∠M = (5z – 3)°, m∠L = (18z + 3)°, m∠JKM = 161° From the Exterior Angle Theorem, m∠M + m∠L = m∠JKM (5z – 3)° + (18z + 3)° = 161° 5z° – 3° + 18z° + 3° = 161° 23z° = 161° z = 161/23 = 7 Substitute z values to find the angles m∠M = (5z – 3)° = ((5 . 7) – 3)° = 32° m∠L = (18z + 3)° = ((18 . 7) + 3)° = 129° From the Triangle Sum Theorem, m∠M + m∠L + m∠LKM = 180º 32º + 129º + m∠LKM = 180º m∠LKM = 19º ESSENTIAL QUESTION CHECK-IN Question 7. Describe the relationships among the measures of the angles of a triangle. Type below: _____ Answer: The sum of all measures of the interior angles of a triangle is 180°. The measure of an exterior angle of a triangle is equal to the sum of its remote interior angles. 11.2 Independent Practice – Angle Theorems for Triangles – Page No. 359 Find the measure of each angle. Question 8. m∠E = _____ ° m∠F = _____ ° Answer: m∠E = 41° m∠F = 41° Explanation: m∠E = x°, m∠F = x°, m∠D = 98° From the Triangle Sum Theorem, the sum of the angles of the traingle is 180° m∠E + m∠D + m∠F = 180° x + 98 + x = 180° 2x + 98 = 180° 2x = 82° x = 41° So, m∠E = 41° m∠F = 41° Question 9. m∠T = _____ ° m∠V = _____ ° Answer: m∠T = 60° m∠V = 30° Explanation: m∠W = 90°, m∠T = 2x°, m∠V = x° From the Triangle Sum Theorem, sum of the angles of the traingle is 180° m∠T + m∠V + m∠W = 180° 2x + x + 90 = 180° 3x = 90° x = 30° So, m∠T = 2x° = 2 . 30° = 60° m∠V = x° = 30° Question 10. m∠G = _____ ° m∠H = _____ ° m∠J = _____ ° Answer: m∠G = 75° m∠H = 60° m∠J = 45° Explanation: m∠G = 5x°, m∠H = 4x°, m∠J = 3x° From the Triangle Sum Theorem, sum of the angles of the traingle is 180° m∠G + m∠H + m∠J = 180° 5x + 4x + 3x = 180° 12x = 90° x = 15° So, m∠G = 5x° = 5 . 15° = 75° m∠H = 4x° = 4. 15° = 60° m∠J = 3x° = 3. 15° = 45° Question 11. m∠Q = _____ ° m∠P = _____ ° m∠QRP = _____ ° Answer: m∠Q = 98° m∠P = 55° m∠QRP = 27° Explanation: Given that m∠Q = (3y + 5)°, m∠P = (2y – 7)°, m∠QRS = 153° From the exterior angle Theorem, ∠QRS + ∠QRP = 180° 153° + ∠QRP = 180° m∠R = m∠QRP = 180° – 153° = 27° From the Triangle Sum Theorem, the sum of the angles of the traingle is 180° m∠P + m∠Q + m∠R = 180° (3y + 5)° + (2y – 7)°+ 27° = 180° 5y° + 25 = 180° 5y° = 155° y = 31° m∠Q = (3y + 5)° = ((3 . 31°) + 5)° = 98° m∠P = (2y – 7)° = ((2. 31° – 7)° = 55° m∠QRP = 27° Question 12. m∠ACB = _____ ° m∠DCE = _____ ° m∠BCD = _____ ° Answer: m∠ACB = 44° m∠DCE = 35° m∠BCD = 101° Explanation: In traingle ABC, m∠A = 78°, m∠B = 58°, m∠ACB = ?° From the Triangle Sum Theorem, the sum of the angles of the traingle is 180° m∠A + m∠B + m∠ACB = 180° 78° + 58° + m∠ACB = 180° m∠ACB = 180° – 136° m∠ACB = 44° In traingle CDE, m∠D = 85°, m∠E = 60°, m∠CDE = ?° From the Triangle Sum Theorem, the sum of the angles of the traingle is 180° m∠D + m∠E + m∠CDE = 180° 85° + 60° + m∠CDE = 180° m∠CDE = 180° – 145° m∠CDE = 35° From the Exterior Angle Theorem, m∠ACB + m∠CDE + m∠BCD = 180° 44° + 35° + m∠BCD = 180° m∠BCD = 180° – 79° m∠BCD = 101° Question 13. m∠K = _____ ° m∠L = _____ ° m∠KML = _____ ° m∠LMN = _____ ° Answer: Explanation: m∠K = 2x°, m∠L = 3x°, m∠KML = x° So, From the Triangle Sum Theorem, the sum of the angles of the traingle is 180°. m∠K + m∠L + m∠KML = 180° 2x° + 3x° + x° = 180° 6x° = 180° x= 30° ∠KML = x = 30° ∠L = 3x = 3 . 30° = 90° ∠K = 2x = 2 . 30° = 60° From the Exterior Angle Theorem, ∠KML + ∠LMN = 180° ∠LMN = 180° – 30° = 150° Question 14. Multistep The second angle in a triangle is five times as large as the first. The third angle is two-thirds as large as the first. Find the angle measures. The measure of the first angle: _____ ° The measure of the second angle: _____ ° The measure of the third angle: _____ ° Answer: The measure of the first angle: 27° The measure of the second angle: 135° The measure of the third angle: 18° Explanation: Let us name the angles of a triangle as ∠1, ∠2, ∠3. Consider ∠1 as x. ∠2 is 5 times as large as the first. ∠2 = 5x Also, ∠3 = 2/3 . x So, From the Triangle Sum Theorem, the sum of the angles of the triangle is 180°. x+ 5x + (2/3 . x) = 180° 20x = 540° x = 27° So, ∠1 = x = 27° ∠2 = 5x = 5 . 27° = 135° ∠3 = 2/3 . x = 2/3 . 27° = 18° The measure of the first angle: 27° The measure of the second angle: 135° The measure of the third angle: 18° Angle Theorems for Triangles – Page No. 360 Question 15. Analyze Relationships Can a triangle have two obtuse angles? Explain. _____ Answer: No; a triangle can NOT have two obtuse angles Explanation: The measure of an obtuse angle is greater than 90°. Two obtuse angles and the third angle would have a sum greater than 180° FOCUS ON HIGHER ORDER THINKING Question 16. Critical Thinking Explain how you can use the Triangle Sum Theorem to find the measures of the angles in an equilateral triangle. Type below: _____ Answer: All angles have the same measure in an equilateral triangle Explanation: Using the Triangle Sum Theorem, ∠x + ∠x + ∠x = 180° 3∠x = 180° ∠x = 60° All angles have the same measure in an equilateral triangle Question 17. a. Draw Conclusions Find the sum of the measures of the angles in quadrilateral ABCD. (Hint: Draw diagonal \(\overline { AC } \). How can you use the figures you have formed to find the sum?) Sum: _____ ° Answer: Sum: 360° Question 17. b. Make a Conjecture Write a “Quadrilateral Sum Theorem.” Explain why you think it is true. Type below: _____ Answer: The sum of the angle measures of a quadrilateral is 360° Any quadrilateral can be divided into two triangles (180 + 180 = 360) Question 18. Communicate Mathematical Ideas Describe two ways that an exterior angle of a triangle is related to one or more of the interior angles. Type below: _____ Answer: An exterior angle and it’s an adjacent interior angle equal 180° An exterior angle equals the sum of the two remote interior angles. Guided Practice – Angle-Angle Similarity – Page No. 366 Question 1. Explain whether the triangles are similar. Label the angle measures in the figure. Type below: _____ Answer: △ABC has angle measures _____and △DEF has angle measures_____. Because _____in one triangle are congruent to _____in the other triangle, the triangles are_____. Answer: △ABC has angle measures 40°, 30°, and 109° and △DEF has angle measures 41°, 109°, and 30°. Because 2∠s in one triangle are congruent to in the other triangle, the triangles similar. Question 2. A flagpole casts a shadow 23.5 feet long. At the same time of day, Mrs. Gilbert, who is 5.5 feet tall, casts a shadow that is 7.5 feet long. How tall in feet is the flagpole? Round your answer to the nearest tenth. _____ ft Answer: 17.2 ft Explanation: In similar triangles, corresponding side lengths are proportional. 5.5/7.5 = h/23.5 h (7.5) = 129.25 h = 129.25/7.5 h = 17.23 Rounding to the nearest tenth h = 17.2 feet Question 3. Two transversals intersect two parallel lines as shown. Explain whether △ABC and △DEC are similar. ∠BAC and∠EDC are _____since they are _____. ∠ABC and∠DEC are _____since they are _____. By _____, △ABC and△DEC are _____. Type below: _____ Answer: ∠BAC and∠EDC are congruent since they are alt. interior ∠s ∠ABC and∠DEC are congruent since they are alt. interior ∠s. By AA similarity, △ABC and△DEC are similar. ESSENTIAL QUESTION CHECK-IN Question 4. How can you determine when two triangles are similar? Type below: _____ Answer: If 2 angles of one triangle are congruent to 2 angles of another triangle, the triangles are similar by the Angle-Angle Similarity Postulate 11.3 Independent Practice – Angle-Angle Similarity – Page No. 367 Use the diagrams for Exercises 5–7. Question 5. Find the missing angle measures in the triangles. Type below: _____ Answer: m∠B = 42° m∠F = 69° m∠H = 64° m∠K = 53° Explanation: Using the Triangle Sum Theorem, m∠A + m∠B + m∠C = 180° 85° + m∠B + 53° = 180° 138° + m∠B = 180° m∠B = 180° – 138° m∠B = 42° Using the Triangle Sum Theorem, m∠D + m∠E + m∠F = 180° We substitute the given angle measures and we solve for m∠F 64° + 47° + m∠F = 180° 111° + m∠F = 180° m∠F = 180° – 111° m∠F = 69° Using the Triangle Sum Theorem, m∠G + m∠H + m∠J = 180° We substitute the given angle measures and we solve for m∠H 47° + m∠H + 69° = 180° 116° + m∠H = 180° m∠H = 180° – 116° m∠H = 64° Using the Triangle Sum Theorem, m∠J + m∠K + m∠L = 180° We substitute the given angle measures and we solve for m∠K 85° + m∠K + 42° = 180° 127° + m∠K = 180° m∠K = 180° – 127° m∠K = 53° Question 6. Which triangles are similar? Type below: _____ Answer: △ABC and △JKL are similar because their corresponding angles are congruent. Also, △DEF and △GHJ are similar because their corresponding is congruent. Question 7. Analyze Relationships Determine which angles are congruent to the angles in △ABC. ∠A ≅ ∠ _____ ∠B ≅ ∠ _____ ∠C ≅ ∠ _____ Answer: △JKL ≅ △ABC Explanation: △JKL has angle measures that are the same as those is △ABC ∠A ≅ ∠ J ∠B ≅ ∠ L ∠C ≅ ∠ K Therefore, they are congruent. Question 8. Multistep A tree casts a shadow that is 20 feet long. Frank is 6 feet tall,and while standing next to the tree he casts a shadow that is 4 feet long. a. How tall is the tree? h = _____ ft Answer: h = 30 ft Explanation: In similar triangles, corresponding side lengths are proportional. 20/4 = h/6 5 = h/6 h = 30 The tree is 30 feet tall. Question 8. b. How much taller is the tree than Frank? _____ ft Answer: 24 ft Explanation: 30 – 6 = 24 The tree is 24 feet taller than Frank. Question 9. Represent Real-World Problems Sheila is climbing on a ladder that is attached against the side of a jungle gym wall. She is 5 feet off the ground and 3 feet from the base of the ladder, which is 15 feet from the wall. Draw a diagram to help you solve the problem. How high up the wall is the top of the ladder? _____ ft Answer: 25 ft Explanation: 3/15 = 5/h 15 ×3 = 3h 75 = 3h h = 75/3 = 25 Question 10. Justify Reasoning Are two equilateral triangles always similar? Explain. _____ Answer: yes; two equilateral triangles are always similar. Each angle of an equilateral triangle is 60°. Since both triangles are equilateral then they are similar. Angle-Angle Similarity – Page No. 368 Question 11. Critique Reasoning Ryan calculated the missing measure in the diagram shown. What was his mistake? \(\frac{3.4}{6.5}=\frac{h}{19.5}\) 19.5 × \(\frac{3.4}{6.5}=\frac{h}{19.5}\) × 19.5 \(\frac{66.3}{6.5}\) = h 10.2cm = h Type below: _____ Answer: In the first line, Ryan did not take the sum of 6.5 and 19.5 to get the denominator on the right. The denominator on the right should be 26 instead of 19.5 the correct value for h 3.4/6.5 = h/26 h = (3.4/6.5) × 26 h = 13.6cm FOCUS ON HIGHER ORDER THINKING Question 12. Communicate Mathematical Ideas For a pair of triangular earrings, how can you tell if they are similar? How can you tell if they are congruent? Type below: _____ Answer: The earrings are similar if two angle measures of one are equal to two angle measures of the other. The earrings are congruent if they are similar and if the side lengths of one are equal to the side lengths of the other. Question 13. Critical Thinking When does it make sense to use similar triangles to measure the height and length of objects in real life? Type below: _____ Answer: If the item is too tall or the distance is too long to measure directly, similar triangles can help with measuring. Question 14. Justify Reasoning Two right triangles on a coordinate plane are similar but not congruent. Each of the legs of both triangles are extended by 1 unit, creating two new right triangles. Are the resulting triangles similar? Explain using an example. _____ Answer: Two triangles are similar if their corresponding angles are congruent and the lengths of their corresponding sides are proportional. If each of the legs of both triangles is extended by 1 unit, the ratio between proportional sides does not change. Therefore, the resulting triangles are similar. Ready to Go On? – Model Quiz – Page No. 369 11.1 Parallel Lines Cut by a Transversal In the figure, line p || line q. Find the measure of each angle if m∠8 = 115°. Question 1. m∠7 = _____ ° Answer: m∠7 = 65° Explanation: According to the exterior angle theorem, m∠7 + m∠8 = 180° m∠7 + 115° = 180° m∠7 = 180° – 115° m∠7 = 65° Question 2. m∠6 = _____ ° Answer: m∠6 = 115° Explanation: From the given figure, Line P is parallel to line Q. So, the angles given in line P is equal to the angles in line Q. They are corresponding angles. So, m∠8 is parallel is m∠6 or m∠8 = m∠6 = 115° Question 3. m∠1 = _____ ° Answer: m∠1 = 115° Explanation: ∠1 and ∠6 are alternative exterior angles. So, m∠1 = m∠6 = 115° 11.2 Angle Theorems for Triangles Find the measure of each angle. Question 4. m∠A = _____ ° Answer: m∠A = 48° Explanation: m∠A + m∠B + m∠C = 180° 4y° + (3y + 22)° + 74° = 180° 7y = 180 – 96 = 84 y = 12° m∠A = 4y° = 4 (12°) = 48° m∠B = (3y + 22)° = (3(12°) + 22)° = 58° Question 5. m∠B = _____ ° Answer: m∠B = 58° Explanation: m∠A + m∠B + m∠C = 180° 4y° + (3y + 22)° + 74° = 180° 7y = 180 – 96 = 84 y = 12° m∠A = 4y° = 4 (12°) = 48° m∠B = (3y + 22)° = (3(12°) + 22)° = 58° Question 6. m∠BCA = _____ ° Answer: m∠BCA = 74° Explanation: m∠BCD + m∠BCA = 180° 106° + m∠BCA = 180° m∠BCA = 180° – 106° m∠BCA = 74° So, m∠BCA = 74° 11.3 Angle-Angle Similarity Triangle FEG is similar to triangle IHJ. Find the missing values. Question 7. x = _____ Answer: x = 16 Explanation: In similar triangles, corresponding side lengths are proportional. HJ/EG = IJ/FG (x + 12)/42 = 40/60 (x + 12)/42 = 4/6 6x = 96 x = 16 Question 8. y = _____ Answer: y = 9 Explanation: In similar triangles, corresponding side lengths are congruent. m∠HJI = m∠EGF (5y + 7)° = 52° 5y° + 7° = 52° 5y° = 45° y = 9 Question 9. m∠H = _____° Answer: m∠H = 92° Explanation: Using the Triangle Sum Theorem, m∠E + m∠F + m∠G = 180° We substitute the given angle measures and we solve for m∠E m∠E + 36° + 52° = 180° m∠E + 88° = 180° m∠E = 92° In similar angles, corresponding side lengths are congruent m∠H = m∠E m∠H = 92° ESSENTIAL QUESTION Question 10. How can you use similar triangles to solve real-world problems? Type below: _____ Answer: we know that if two triangles are similar, then their corresponding angles are congruent and the lengths of their corresponding sides are proportional. We can use this to determine values that we cannot measure directly. For example, we can calculate the length of the tree if we measure its shadow and our shadow on a sunny day. Selected Response – Mixed Review – Page No. 370 Use the figure for Exercises 1 and 2. Question 1. Which angle pair is a pair of alternate exterior angles? Options: A. ∠5 and ∠6 B. ∠6 and∠7 C. ∠5 and ∠4 D. ∠5 and ∠2 Answer: C. ∠5 and ∠4 Explanation: ∠5 and ∠4 are alternate exterior angles Question 2. Which of the following angles is not congruent to ∠3? Options: A. ∠1 B. ∠2 C. ∠6 D. ∠8 Answer: B. ∠2 Explanation: ∠2 and ∠3 are same-side interior angles. They are not congruent instead their sum is equal to 180° Question 3. The measures, in degrees, of the three angles of a triangle are given by 2x + 1, 3x – 3, and 9x. What is the measure of the smallest angle? Options: A. 13° B. 27° C. 36° D. 117° Answer: B. 27° Explanation: From the Triangle Sum Theorem, the sum of the angles of the triangle is 180° m∠1 + m∠2 + m∠3 = 180° (2x + 1)° + (3x – 3)° + (9x)° = 180° 2x° + 1° + 3x° – 3° + 9x° = 180° 14x° – 2° = 180° 14x° = 178° x = 13 Substitute the value of x to find the m∠1, m∠2, and m∠3 m∠1 = (2x + 1)° = (2(13) + 1)° = 27° m∠2 = (3x – 3)° = (3(13) – 3)° = 36° m∠3 = (9x)° = (9(13))° = 117° The smallest angle is 27° Question 4. Which is a possible measure of ∠DCA in the triangle below? Options: A. 36° B. 38° C. 40° D 70° Answer: D 70° Explanation: Using the Exterior Angle Theorem m∠A + m∠B = m∠DCA m∠A + 40° = m∠DCA m∠DCA will be greater than 40°. The only suitable option is D, 70°. Question 5. Kaylee wrote in her dinosaur report that the Jurassic period was 1.75 × 108 years ago. What is this number written in standard form? Options: A. 1,750,000 B. 17,500,000 C. 175,000,000 D. 17,500,000,000 Answer: C. 175,000,000 Explanation: 1.75 × 108 standard form Move the decimal point to 8 right places. 175,000,000 Question 6. Given that y is proportional to x, what linear equation can you write if y is 16 when x is 20? Options: A. y = 20x B. y = \(\frac{5}{4}\) x C. y = \(\frac{4}{5}\)x D. y = 0.6x Answer: C. y = \(\frac{4}{5}\)x Explanation: Y=4/5x 16=4/5(20) 4/5×20/1=80/5 80/5=16 Mini-Task Question 7. Two transversals intersect two parallel lines as shown. a. What is the value of x? x = _____ Answer: x = 4 Explanation: m∠JKL = m∠LNM 6x + 1 = 25 6x = 24 x = 4 Question 7. b. What is the measure of ∠LMN? _____° Answer: 23° Explanation: m∠LMN = 3x + 11 = 3(4) + 11 = 12 + 11 = 23 Question 7. c. What is the measure of ∠KLM? ∠KLM = _____° Answer: ∠KLM = 48° Explanation: ∠KLM exterior angle of the triangle LMN m∠KLM = m∠LNM + m∠LMN

= 25 + 23 = 48 Question 7. d. Which two triangles are similar? How do you know? Type below: _____ Answer: triangle JKL = triangle LNM triangle KJL = triangle LMN Explanation: triangle JLK and triangle LNM are similar. triangle JKL = triangle LNM triangle KJL = triangle LMN Summary: The solutions provided in the Go Math Grade 8 Answer Key Chapter 11 Angle Relationships in Parallel Lines and Triangles are made by the professionals. Practice all the math questions available on the 8th Grade Text Book and learn how to solve the questions in a simple way. Hope the information provided in this article is beneficial for all the students of grade 8. Keep in touch with our website to get the pdfs of all the Go Math Grade 8 Answer Key Chapterwise.

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