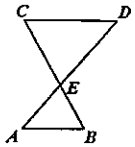
Geometry
Unit 7 – Similar Triangles

Part I: Similarity

1. **In the given diagram, if $\Delta DCE \square \Delta ABE$, which proportion is true?**



A $\frac{AB}{DC}=\frac{DE}{AE}$

B $\frac{AB}{DC}=\frac{AE}{DE}$

C $\frac{AE}{DC}=\frac{AB}{DE}$

D $\frac{DC}{AB}=\frac{AE}{DE}$

2. **Given $\Delta RST \square \Delta XYZ$, which of the following choices does *not* have to be true?**

A $\angle R \cong \angle X$

B $\angle T \cong \angle Z$

C $\overline{RS} \cong \overline{XY}$

D $\frac{RS}{XY}=\frac{ST}{YZ}$

3. **Which triangles *must* be similar?**

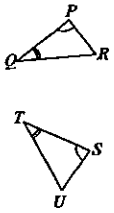
A Two obtuse triangles

B Two scalene triangles with congruent bases

C Two right triangles

D Two isosceles triangles with congruent vertex angles

4. **The triangles in the diagram below are similar. Which of the following is *not* a valid statement?**



A $\Delta PQR \square \Delta STU$

B $\Delta QPR \square \Delta TSU$

C $\angle R \cong \angle U$

D $\frac{PR}{SU}=\frac{QP}{TU}$

5. **Which of the following choices does *not* have to be true?**

A If $\Delta ABC \square \Delta DEF$ then $\Delta ABC \cong \Delta DEF$

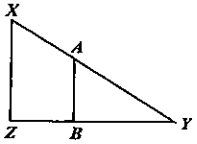
B If $\Delta ABC \cong \Delta DEF$ then $\Delta ABC \square \Delta DEF$

C All 30°- 60°- 90° triangles are similar

D All 45°- 45°- 90° triangles are similar

Part II: Similarity Theorems/Postulates

6. **Which of the following facts would be sufficient to prove that ΔXYZ and ΔAYB are similar?**



A $\overline{ZB} \cong \overline{BY}$

B $\overline{XZ} \square \overline{AB}$

C $\angle X \cong \angle Y$

D $\angle XZY$ is a right angle

7. **Which statement can be used to prove $\Delta ABC \square \Delta DEF$ by SAS–?**

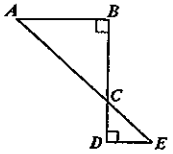
A $\angle E \cong \angle B,\ \frac{DE}{AB}=\frac{DF}{AC}$

B $\angle D \cong \angle A,\ \frac{DE}{AB}=\frac{DF}{AC}$

C $\angle E \cong \angle B,\ \angle F \cong \angle C,\ \frac{EF}{BC}$

D $\angle D \cong \angle A,\ \angle E \cong \angle B,\ \angle F \cong \angle C$

8. **Given $\overline{AB} \perp \overline{BD}$ and $\overline{ED} \perp \overline{DB}$. Which theorem or postulate can be used to prove $\Delta ABC \square \Delta EDC$?**



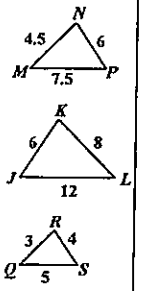
A AA

B SAS

C SSS

D ASA

9. **Determine which two of the three given triangles are similar. State the similarity theorem or postulate that would be used to prove that the triangles are similar.**
(note: figures are not drawn to scale)



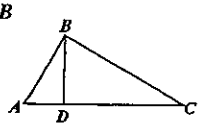
A $\Delta MNP, \Delta QRS,\ SSS \square$

B $\Delta MNP, \Delta QRS,\ SAS \square$

C $\Delta MNP, \Delta QRS,\ AA \square$

D $\Delta JKL, \Delta QRS,\ SSS \square$

10. **Given: $\overline{BD} \perp \overline{AC}$; $\overline{AB} \perp \overline{BC}$**
Prove: $\Delta ABC \square \Delta ADB$



Statements	Reasons
1. $\overline{BD} \perp \overline{AC}$; $\overline{AB} \perp \overline{BC}$	1. Given
2. $\angle ABC$ and $\angle ADB$ are right angles	2. Perpendicular lines form right angles
3. $\angle ABC \cong \angle ADB$	3. All right angles are congruent
4. $\angle A \cong \angle A$	4. Reflexive Property
5. $\Delta ABC \square \Delta ADB$	5. ?

What is the missing reason in line 5?

A SSS Similarity Theorem

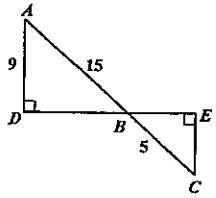
B SAS Similarity Theorem

C AA Similarity Postulate

D All right triangles are similar

Part III: Application

11. **In the figure below, $\overline{AD} \perp \overline{DE}$, $\overline{CE} \perp \overline{DE}$, $AD = 9$, $AB = 15$, and $BC = 5$. What is the length of $\overline{CE}$?**



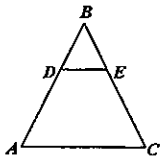
A 3

B 7

C 8.3

D 27

12. If $\overline{DE} \square \overline{AC}$ and $3(BD) = (AD)$, what is the ratio of the *area* of ΔBDE to the *area* of ΔBAC?



A 1:3

B 1:4

C 1:9

D 1:16

13. If the ratio of similarity (scale factor) of ΔABC to ΔDEF is 3:8, and the perimeter of $\Delta ABC = 24$, what is the perimeter of ΔDEF?

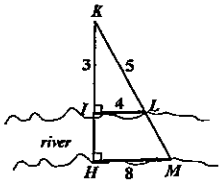
A 9 units

B 24 units

C 36 units

D 64 units

14. Find the distance, *IH*, across the river.



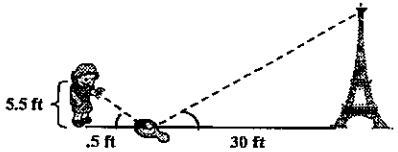
A 2 units

B 3 units

C 6 units

D 8 units

15. Sally is visiting King's Dominion amusement park in Doswell, Virginia. The park has a scale model of the Eiffel Tower. To determine the height of the model, Sally places a mirror on the ground and stands where she can see the top of the model, shown below.



How tall is the model of the Eiffel Tower?

A 33.3 ft

B 82.5 ft

C 330 ft

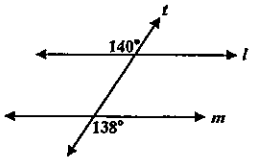
D 825 ft

 Name_____

Show all work in the space provided.

Part IV: Short Answer

16. Mr. Math has asked his class to identify the parallel lines in the diagram below.



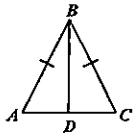
Darla said "duh, it is so obvious that there are no parallel lines in the drawing."

- Do you agree or disagree with Darla? *(1pt)*
- Justify your answer *(3 pts)*

17. Andy and Dave are putting in a cement patio. To do this they must build a wooden frame into which the concrete will be poured. One section of the patio is in the shape of a triangle. Andy quickly measures and finds the triangular frame has sides 8 feet, 12 feet, and 24 feet. Dave tells Andy that something doesn't seem right about the measurements of the triangle.

- Is anything wrong with the measures of the triangle? *(1 pt)*
- Justify your answer *(3 pts)*

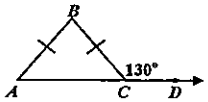
18. Given: ΔABC with $\overline{AB} \cong \overline{CB}$;
$\overline{BD}$ is an altitude
Prove: $\overline{AD} \cong \overline{CD}$



Complete the proof by writing reasons for the missing steps. *(4 pts)*

Statements	Reasons
1. ΔABC with $\overline{AB} \cong \overline{CB}$	1. Given
2. $\overline{BD}$ is an altitude	2. Given
3. $\overline{BD} \perp \overline{AC}$	3.
4. $\angle BDA$ and $\angle BDC$ are right angles	4. Perpendicular lines form right angles
5. ΔBDA and ΔBDC are right triangles	5.
6. $\overline{BD} \cong \overline{BD}$	6. Reflexive Property
7. $\Delta BDA \cong \Delta BDC$	7.
8. $\overline{AD} \cong \overline{CD}$	8.

19. Study the diagram below and list as many things as you can about it. This is *not* a problem to solve; rather you are to list the *characteristics and relationships* you find. *(4pts)*



20. **The statement below can be true or false.**

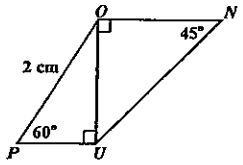
The median and altitude of a triangle can be the same line segment.

- **Show and explain one example that makes the statement above *true*.** *(2 pts)*

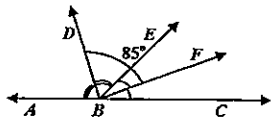
- **Show and explain one example that makes the statement above *false*.** *(2 pts)*

21. **It is 4.5 blocks from Carlos' house to Matt's house. From Matt's house to Kristen's house is 10.5 blocks, and from Kristen's house to Carlos' house is 6 blocks.**
    - **If they all live on the same street, whose house is *between* the other two?** *(1 pt)*
    - **Justify your answer.** *(3 pts)*

22. **In the figure below, $OP = 2$ cm. What is the length of $\overline{UN}$?** *(4 pts)*

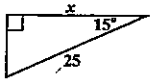


23. **Using the given measure and the markings, what is wrong with this picture?**



- **Justify your answer.** *(4 pts)*

24. **Solve for x in the triangle below.** *(4 pts)*



$\sin 15° = 0.26$
$\cos 15° = 0.97$
$\tan 15° = 0.27$

25. **The distance between points A and B is 5 units. The coordinates of point A are $(-2, -1)$ Points A and B are not horizontally or vertically aligned.**
    - **Find one possible set of coordinates of point B.** *(1 pts)*
    - **Justify your solution** *(3 pts)*

Part I: Angles and Sides

1. **What is the measure of an exterior angle of a regular pentagon?**

   A 72°

   B 108°

   C 360°

   D 540°

2. **What is the measure of each interior angle of a regular octagon?**

   A 45°

   B 72°

   C 135°

   D 180°

3. **If each exterior angle of a regular polygon measures 40°, what is the total number of sides in the polygon?**

   A 5

   B 6

   C 8

   D 9

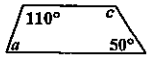
4. **For the trapezoid shown below, what is the $m\angle a + m\angle c$?**

   A 20°

   B 50°

   C 160°

   D 200°



5. **The measures of the interior angles of a pentagon are $9x + 15$, $8x$, $7x - 5$, $6x$, and $5x + 5$. What is the measure, in degrees, of the smallest angle?**

   A 80°

   B 90°

   C 100°

   D 120°

Part II: Area and Perimeter

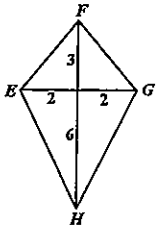
6. **Find the area of kite *EFGH*.**

   A 7 sq. units

   B 18 sq. units

   C 36 sq. units

   D 72 sq. units



7. **If the length of any rectangle is increased by 2 and the width is unchanged, which of the following statements is true?**

   A The perimeter of the second rectangle is increased by 2.

   B The perimeter of the second rectangle is increased by 4.

   C The perimeter of the second rectangle is multiplied by 4.

   D The perimeter of the second rectangle is twice the perimeter of the original rectangle.

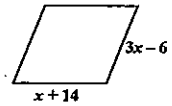
8. **The two consecutive sides of a rhombus are represented by $3x - 6$ and $x + 14$. What is the perimeter of the rhombus?**

   A 10 units

   B 40 units

   C 48 units

   D 96 units



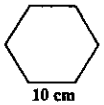
9. **What is the area of a regular hexagon with side measure of 10 cm?**

   A $25\sqrt{3}$ cm^2

   B 50 cm^2

   C $150\sqrt{3}$ cm^2

   D 300 cm^2



10. **The length and width of rectangle *ABCD* are double those of rectangle *EFGH*. What is the ratio between the areas of the two rectangles?**

    A 2 to 1

    B 4 to 1

    C 6 to 1

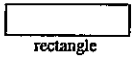
    D 8 to 1

Part III: Quadrilaterals

11. **Angie made the following conjecture:**

The diagonals of a quadrilateral are congruent.

Which figure serves as a counterexample to Angie's conjecture?

A 

B

C

D

12. **Which statement is *not* true for all parallelograms?**

A Opposite angles are congruent

B Consecutive angles are supplementary

C Diagonals bisect each other

D Diagonals are perpendicular

13. **How long is one side of a rhombus that has diagonals that measure 10 and 24 centimeters?**

A 13 cm

B 17 cm

C 26 cm

D 34 cm

14. **In quadrilateral *ABCD*, $m\angle A = 60°$ and $m\angle D = 100°$. Which statement can be used in a proof to show that *ABCD* is *not* a parallelogram?**

A If *ABCD* is a parallelogram, then the opposite sides are congruent.

B If *ABCD* is a parallelogram, then the consecutive angles are congruent.

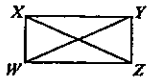
C If *ABCD* is a parallelogram, then the consecutive angles are supplementary.

D If *ABCD* is a parallelogram, then the diagonals bisect each other.

15. **The following proof contains one error.**

Given: *WXYZ* is a rectangle with diagonals $\overline{WY}$ and $\overline{XZ}$.

Prove: $\overline{WY} \cong \overline{XZ}$



Statements	Reasons
1. *WXYZ* is a rectangle with diagonals $\overline{WY}$ and $\overline{XZ}$	1. Given
2. $\overline{WX} \cong \overline{ZY}$	2. Diagonals of a rectangle bisect each other
3. $\overline{WZ} \cong \overline{WZ}$	3. Reflexive Property
4. $\angle XWZ$ and $\angle YZW$ are right angles	4. Definition of a rectangle
5. $\angle XWZ \cong \angle YZW$	5. All right angles are congruent
6. $\Delta XWZ \cong \Delta YZW$	6. SAS
7. $\overline{WY} \cong \overline{XZ}$	7. CPCTC

Which reason in the above proof is incorrect?

A step 2

B step 4

C step 5

D step 6

Part IV: Application

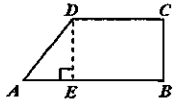
16. **In the given figure below, $AB = 26$ ft and $CD = 18$ ft. If trapezoid *ABCD* has an area of 220 square feet, what is the length of $\overline{DE}$, the altitude of trapezoid *ABCD*?**

A 6 ft

B 8 ft

C 10 ft

D 15 ft



17. **Mrs. Jackson would like to have the wood floor in her kitchen refinished. The floor is in the shape of a rectangle that is 16 ft long by 14 ft wide. The flooring company charges \$3 for every square foot of flooring. What will it cost Mrs. Jackson to have her kitchen floor refinished?**

A \$74

B \$90

C \$224

D \$672

18. **Two regular pentagons have a scale factor (ratio of similarity) of 2:3. If the area of the larger pentagon is 54 cm^2, what is the area of the smaller pentagon?**

A 24 cm^2

B 36 cm^2

C 81 cm^2

D 117 cm^2

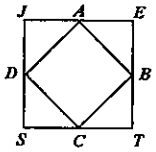
19. **Points *A*, *B*, *C*, and *D* are midpoints on the sides of square *JETS*. If the area of *JETS* is 36 cm^2, what is the area of ABCD?**

A 9 cm^2

B $9\sqrt{2}$ cm^2

C 18 cm^2

D $18\sqrt{2}$ cm^2



20. **Marcy is making a quilt for her son's room that will measure 2 feet by 4 feet. She is thinking about making the quilt larger by increasing the length of the smaller side by 50%. What would be the area of the larger quilt?**

A 4 ft^2

B 12 ft^2

C 16 ft^2

D 64 ft^2

Unit 8 Assessment

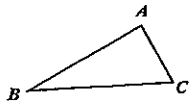
Name _____

Show all work in the space provided.

Part V: Short Answer

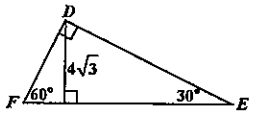
21. **Use the given angle measures in the triangle at the right.**

$m\angle A = 5x$
$m\angle B = x+1$
$m\angle C = 3x-2$



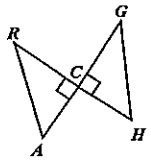
If $x = 10°$, describe what is wrong with this picture. *(4pts)*

22. **Find the perimeter of ΔDEF.** *(4 pts)*

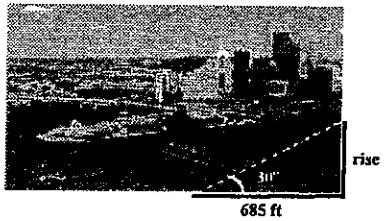


23. **Given: $\Delta CGH \cong \Delta CRA$, $AC = 5$, $CG = 12$, and $\angle GCH$ and $\angle RCA$ are right angles.**

Find the length of GH. *(4 pts)*



24. **In Pittsburgh, PA the Duquesne Incline transports passengers from the river valley up to Mount Washington. The Incline has an angle of elevation of 30°and a 685 foot run.**



What is the rise of the Incline? *(4 pts)*

$\sin 30° \approx 0.50$
$\cos 30° \approx 0.87$
$\tan 30° \approx 0.58$

25. **The statement below is true in some cases and *not* true in at least one case.**

Right triangles are similar to each other.

- **Give one example that shows when the statement is true.** *(2 pts)*

- **Give one example that shows when the statement is *not* true.** *(2 pts)*