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## Geometry Second Semester Final Exam Review

1. Solve:
$\frac{35}{31}=\frac{x}{12}$
2. Solve the proportion $\frac{5}{x-1}=\frac{7}{x}$.
3. Solve the proportion $\frac{3}{2 x}=\frac{7}{5}$.
4. Mr. Jones has taken a survey of college students and found that 1 out of 6 students are liberal arts majors. If a college has 7000 students, what is the best estimate of the number of students who are liberal arts majors?
a. 1167
b. 117
c. 210
d. 42,000
5. Mr. Jones has taken a survey of college students and found that 90 out of 106 students are liberal arts majors. If a college has 7596 students, what is the best estimate of the number of students who are liberal arts majors?
a. 45
b. 8946
c. 64,494
d. 6449
6. A survey indicated that 4 out of 6 doctors used brand X aspirin. If 3600 doctors were surveyed, how many used brand X ?
7. Given that $\frac{E D}{B A}=\frac{E C}{B C}$, find $B C$ to the nearest tenth. The figure is not drawn to scale.

a. 40.5
b. 0.2
c. 38.3
d. 21.3
8. Given that $\frac{E D}{B A}=\frac{E C}{B C}$, find $A B$ to the nearest tenth. The figure is not drawn to scale.

9. Determine whether the figures are similar.

10. Are the two triangles (not drawn to scale) similar? If so, explain why they are.

11. In the diagram, $\triangle A B C$ is similar to $\triangle E D C$. Write the statement of proportionality.

12. Given that $\triangle A B C \sim \triangle D E F$, solve for $x$ and $y$.

13. The triangles below are similar. Find $x$.

a. 3.1
b. 93.5
c. 24.9
d. 99
14. A building casts a shadow 200 meters long. At the same time, a pole 4 meters high casts a shadow 20 meters long. What is the height of the building?
15. A building casts a shadow 168 meters long. At the same time, a pole 5 meters high casts a shadow 20 meters long. What is the height of the building?
16. Two ladders are leaning against a wall at the same angle as shown. How long is the shorter ladder?

a. 8 ft
b. 22 ft
c. 18 ft
d. 36 ft
17. Sadie wants to find the height of the tallest building in her city. She stands 130 feet away from the building. There is a tree 37 feet in front of her, which she knows is 17 feet tall. How tall is the building? (Round to the nearest foot.)

18. State the postulate or theorem that can be used to prove that the two triangles are similar.

19. State the postulate or theorem that can be used to prove that the two triangles are similar.

20. Shown below is an illustration of the $\qquad$ .

a. AA Similarity Postulate
c. SSS Similarity Theorem
b. SAS Congruence Theorem
d. SAS Similarity Theorem
21. The postulate or theorem that can be used to prove that the two triangles are similar is $\qquad$ .

a. SAS Similarity Theorem
c. SSS Similarity Theorem
b. ASA Congruence Theorem
d. AA Similarity Postulate
22. Given: $\triangle B C D \sim \triangle E F G$. Find the length of $\overline{B C}$.

23. Tell whether the pair of triangles is similar. Explain your reasoning.

24. If $p \| q$, solve for $x$.

25. Given: $\overline{P Q} \| \overline{B C}$. Find the length of $\overline{A C}$.

26. Given $\overline{A E} \| \overline{B D}$. Solve for $x$.

27. Given: $\overline{P Q} \| \overline{B C}$. Find the length of $\overline{A Q}$.

a. 11
b. 9
c. 13
d. 6
28. Find the value of $x$ to one decimal place.

a. 2.2
b. 22.5
c. 0.5
d. 19.0
29. Find $E F$.

30. For the figure shown, which statement is not true?

a. $\frac{w}{y}=\frac{x}{z}$
b. $\quad w x=y z$
c. $w z=x y$
d. $\frac{w}{x}=\frac{y}{z}$
31. Find the length of the leg of this right triangle. Give an approximation to 3 decimal places.

32. Find the length of the leg of this right triangle. Give an approximation to 3 decimal places.

a. 8.062
b. $\quad 17.748$
c. 46.098
d. 18.028
33. How long is a string reaching from the top of a $12-\mathrm{ft}$ pole to a point on the ground that is 6 ft from the bottom of the pole? Give an exact answer and an approximation to 3 decimal places.
34. How long is a string reaching from the top of a $12-\mathrm{ft}$ pole to a point on the ground that is 11 ft from the base of the pole?
a. $\sqrt{13} \mathrm{ft}$
b. $\sqrt{23} \mathrm{ft}$
c. $\sqrt{265} \mathrm{ft}$
d. $\sqrt{255} \mathrm{ft}$
35. A 25.5 foot ladder rests against the side of a house at a point 24.1 feet above the ground. The foot of the ladder is $x$ feet from the house. Find the value of $x$ to one decimal place.

a. 1.9
b. 7.0
c. 8.3
d. 10.1
36. Find $a, b$, and $h$.

37. Find the length of the altitude drawn to the hypotenuse.

38. Find the value of $x$.

a. $3 \sqrt{2}$
b. $3 \sqrt{6}$
c. $3 \sqrt{5}$
d. $3 \sqrt{30}$
39. Find the value of the variable in the diagram.

40. Find the value of $x$ and $y$.

41. Find the value of $x$ and $y$.

42. An equilateral triangle has side lengths of 10 . The length of its altitude is $\qquad$ .
a. $10 \sqrt{5}$
b. 5
c. $5 \sqrt{10}$
d. $5 \sqrt{3}$
43. Find the value of $x$.

44. Find $\tan A$ for the right triangle below:

45. Explain how a tangent ratio can be used to find the height of the building in the figure below. Find the height of the building when $\angle A=35^{\circ}$.

46. A photographer shines a camera light at a particular painting forming an angle of $47^{\circ}$ with the camera platform. If the light is 52 feet from the wall where the painting hangs, how high above the platform is the painting?

a. $\quad 0.93 \mathrm{ft}$
b. $\quad 55.76 \mathrm{ft}$
c. $\quad 1.07 \mathrm{ft}$
d. $\quad 48.49 \mathrm{ft}$
47. Write $\sin B$.

48. Find $\sin P, \cos P, \tan P$.

49. Write the trigonometric ratio.

B. $\tan B$
C. $\cos A$
50. To find the height of a tower, a surveyor positions a transit that is 2 meters tall at a spot 40 meters from the base of the tower. She measures the angle of elevation to the top of the tower to be $46^{\circ}$. What is the height of the tower, to the nearest meter?
51. A slide 4.4 m long makes an angle of $33^{\circ}$ with the ground. How high is the top of the slide above the ground?
a. $\quad 2.53 \mathrm{~m}$
b. 2.4 m
c. $\quad 3.69 \mathrm{~m}$
d. $\quad 2.86 \mathrm{~m}$
52. Liola drives 19 km up a hill that is at a grade of $15^{\circ}$. What horizontal distance, to the nearest tenth of kilometer, has she covered?
a. 5.1 km
b. $\quad 4.9 \mathrm{~km}$
c. $\quad 14.2 \mathrm{~km}$
d. $\quad 18.4 \mathrm{~km}$
53. Find the value of $x$, to the nearest whole number. (not drawn to scale)

54. Find $x$, to the nearest hundredth.

55. Solve the right triangle: $\alpha=20^{\circ}$ and $a=20$; Find $\beta, b$, and $c$.

56. Find the missing angle and side measures of $\triangle A B C$, given that $\mathrm{m} \angle A=20^{\circ}, \mathrm{m} \angle C=90^{\circ}$, and $C B=20$.
a. $\mathrm{m} \angle B=110^{\circ}, c=58.5, b=55.4$
b. $\mathrm{m} \angle B=70^{\circ}, c=59, b=54.9$
c. $\mathrm{m} \angle B=70^{\circ}, c=58.5, b=54.9$
d. $\mathrm{m} \angle B=110^{\circ}, c=58.5, b=54.9$
57. Two legs of a right triangle have lengths 15 and 8 . The measure of the smaller acute angle is $\qquad$ .
a. $\approx 32.2^{\circ}$
b. $\approx 17^{\circ}$
c. $\approx 61.9^{\circ}$
d. $\approx 28.1^{\circ}$
58. An airplane is flying at an elevation of 1500 feet. What is the airplane's angle of elevation from the runway when it is 5000 feet from the runway? Explain.

59. An antenna is atop the roof of a 100 -foot building, 10 feet from the edge, as shown in the figure below. From a point 50 feet from the base of the building, the angle from ground level to the top of the antenna is $66^{\circ}$. Find $x$, the height of the antenna, to the nearest foot.

60. Find the measure of the missing angle.

61. Find the value of $x$.

62. Find the sum of the measures of the interior angles in the figure.

63. What is the measure of each interior angle in a regular octagon?
64. How many triangles are formed by drawing diagonals from one vertex in the figure? Find the sum of the measures of the angles in the figure.

a. $7,1260^{\circ}$
b. $6,1260^{\circ}$
c. $6,1080^{\circ}$
d. $7,1080^{\circ}$
65. Find the number of sides of a convex polygon if the measures of its interior angles have a sum of $2340^{\circ}$.
66. What is the measure of each exterior angle in a regular pentagon?
67. The measure of each exterior angle of a regular octagon is $\qquad$ .

b. $67.5^{\circ}$ c. $45^{\circ}$
d. $135^{\circ}$
68. The translation vector is $\vec{u}=\langle-7,4\rangle$. If the image of $A$ is $A^{\prime}(6,-4)$, find the coordinates of point $A$.
69. The translation vector is $\vec{u}=\langle 7,-3\rangle$. The image of point $A$ is $A^{\prime}(5,-7)$. Find the coordinates of $A$.
70. The point $A(-7,3)$ is translated onto $A^{\prime}$ by the vector $\vec{u}=\langle 5,-4\rangle$. The coordinates of $A^{\prime}$ are $\qquad$ .
a. $(-2,-1)$
b. $(-12,7)$
c. $(2,-7)$
d. $(5,-4)$
71. The points in a coordinate plane are reflected in the $y$-axis. In general, every point $(x, y)$ is mapped onto what point?
72. The points in a coordinate plane are reflected in the line $y=x$. In general, every point $(x, y)$ is mapped onto what point?
73. Graph the triangle whose vertices have the coordinates given below. Then draw its reflection in the $x$-axis.
$(-6,3),(-3,3),(-5,8)$

74. Suppose the triangle in the figure below is reflected over the $y$-axis. Draw the line of reflection and the image triangle.

75. Name the transformation.

76. Name the transformation.

77. Graph the figure with vertices $(4,-4),(2,-2),(-1,-5)$, and $(1,-7)$. Rotate the figure $180^{\circ}$ about the origin.

78. Name the transformation. (Preimages are unshaded; images are shaded.)

79. The hexagon shown below is equiangular. How many lines of symmetry does it have?

a. 2
b. 1
c. 3
d. 6
80. For the figure below, draw all the lines of symmetry. If there are none, write "none."

81. Which of the following letters (if drawn as simply as possible) has at least one line of symmetry? $\mathbf{Q}, \mathbf{S}, \mathbf{T}, \mathbf{Z}$
a. $\mathbf{S}$
b. $\mathbf{T}$
c. $\mathbf{Q}$
d. $\mathbf{Z}$
82. How many lines of symmetry does a regular hexagon have? Sketch the symmetry lines on the figure below.

83. How many lines of symmetry does an isosceles right triangle have? Draw a diagram to illustrate.
84. Does the clock face below have any rotational symmetry? If so, list any angles of rotation, $180^{\circ}$ or less, that can map it onto itself.

85. Tell whether the figure has rotational symmetry. If so, give each angle and direction of rotation that produces rotational symmetry.

86. Given $R P=22, R A=6$, and $\overline{P Q}$ is tangent to $\odot R$ at $Q$, find $P Q$.

87. Given $\overline{S T}$ is tangent to $\odot R$ at $S$, find $R T$.

88. Given: In $\odot O, m \overparen{B A C}=320^{\circ}$. Find $m \angle A$.

a. $26^{\circ}$
b. $13^{\circ}$
c. $20^{\circ}$
d. $10^{\circ}$
89. Given: In $\odot O, m \overparen{B A C}=298^{\circ}$. Find $m \angle \mathrm{~B}$.

a. $37^{\circ}$
b. $31^{\circ}$
c. $15.5^{\circ}$
d. $18.5^{\circ}$
90. Find the value of $x$.

a. $\quad 10.0$
b. $\quad 14.8$
c. 11.3
d. 17.1
91. Given circle $O$ with radius 34 and $O C=16$. Find the length of $\overline{A B}$.

92. Given circle $O$ with radius 25 and $O C=7$. Find the length of $\overline{A B}$.

93. Find the value of $x$ to the nearest tenth.

94. Find $m \angle P S Q$ if $m \angle P S Q=3 y-5$ and $m \angle P R Q=2 y+15$.

a. $27.5^{\circ}$
b. $20^{\circ}$
c. $55^{\circ}$
d. $35^{\circ}$
95. Given $\odot Q$ and $m \angle B=62^{\circ}$, find $m \overparen{A C}$.

b. $124^{\circ}$
c. $236^{\circ}$
d. $248^{\circ}$
96. Find the value of $x$ if $m \overparen{A B}=20^{\circ}$ and $m \overparen{C D}=62^{\circ}$.

a. $41^{\circ}$
b. $21^{\circ}$
c. $43^{\circ}$
d. $20.5^{\circ}$
97. Find the measure of $\angle 1$.

98. Find the measure of $\angle 1$.

99. Find the measure of $\angle 1$.

100. Find the value of $x$.

a. 18
b. 12
c. 6
d. 9
101. Find the value of $x$.

a. 24
b. 12
c. 18
d. 9
102. Find the value of $x$.

a. 8
b. 6
c. 3
d. none of these
103. Find the value of $x$.

a. 15
b. 8
c. none of these
d. 35
104. Find the area (not drawn to scale):

105. The area of the parallelogram is $\qquad$ .

a. 680 sq. units
b. 800 sq. units
c. $40 \sqrt{111}$ sq. units
d. 340 sq. units
106. Find the area of the region shown by dividing it into two trapezoids.

107. Find the area:


30 in.
108. Find the area of the quadrilateral.

109. Circle $O$ has a radius of 7.39. If $m \angle A O B$ is $112^{\circ}$, then find the length of $\overparen{A B}$ to one decimal place.

110. Find the arc length of $\overparen{A B}$ to two decimal places.

111. Find the area of the shaded region. (Assume that the ends of the figure are semicircles.)

112. Find the area of the shaded region. Use $\pi \approx 3.14$.

113. Each circle is tangent to the other two. If the diameter of the large circle is 12 , the area of the shaded region is $\qquad$ .

a. $\quad 9 \pi$ sq. units
b. $36 \pi$ sq. units
c. $18 \pi$ sq. units
d. $24 \pi$ sq. units
114. Find the area of the shaded region.

a. $\quad 123.15 \mathrm{~cm}^{2}$
b. $\quad 38.48 \mathrm{~cm}^{2}$
c. $\quad 153.94 \mathrm{~cm}^{2}$
d. $\quad 30.79 \mathrm{~cm}^{2}$
115. Find the area of a regular heptagon with side length 10 cm .
a. $\quad 363.4 \mathrm{~cm}^{2}$
b. $\quad 346.7 \mathrm{~cm}^{2}$
c. $403.3 \mathrm{~cm}^{2}$
d. $\quad 726.8 \mathrm{~cm}^{2}$
116. Find the surface area of the right prism below.

117. The right prism below has bases which are equilateral triangles of side length 4 cm . Its height is 5 cm . Find its surface area.

118. Find the surface area of the cylinder to the nearest square unit. Use $\pi \approx 3.14$.

a. $\quad 98 \mathrm{~m}^{2}$
b. $307 \mathrm{~m}^{2}$
c. $62 \mathrm{~m}^{2}$
d. $614 \mathrm{~m}^{2}$
119. The surface area, in square centimeters, of the right cylinder below is $\qquad$ .

a. $\quad\left(7^{2}\right) \pi+14 \pi(12)=217 \pi$
b. $\quad 14 \pi(12)=168 \pi$
c. $98 \pi+(14 \pi) 12=266 \pi$
d. $\left(7^{2} \pi\right)(12)=588 \pi$
120. Name the three dimesional solid which can be formed by this net.

a. Triangular Prism
c. Triangular Pyramid
b. Rectangular Prism
d. Rectangular Pyramid
121. Sketch a net for the solid.

122. The pyramid shown has a square base and a slant height of 7 ft . Find its surface area.

123. The surface area of the right cone shown is $\qquad$ .

a. $44 \pi$ in. ${ }^{2}$
b. $\quad 112 \pi$ in. ${ }^{2}$
c. $16 \sqrt{33} \pi$ in. ${ }^{2}$
d. $36 \pi$ in. ${ }^{2}$
124. Find the volume of the right triangular prism.

a. $60 \mathrm{~m}^{3}$
b. $288 \mathrm{~m}^{3}$
c. $576 \mathrm{~m}^{3}$
d. $36 \mathrm{~m}^{3}$
125. The volume of the right circular cylinder is about $\qquad$ .

a. $\quad 265.5 \mathrm{~m}^{3}$
b. $\quad 326.7 \mathrm{~m}^{3}$
c. $\quad 1036.9 \mathrm{~m}^{3}$
d. $\quad 1061.9 \mathrm{~m}^{3}$
126. A concrete block has a cylindrical hole 4 feet in diameter drilled through it to allow a pipe to pass through. How many cubic feet of concrete are left in the block? Use 3.14 as an approximation for $\pi$ and round your answer to the nearest tenth.

a. $\quad 90.0$ cubic feet
b. 85.4 cubic feet
c. $\quad 140.6$ cubic feet
d. 203.4 cubic feet
127. The pyramid shown has a rectangular base and faces that are isosceles triangles. Find its volume.

128. Calculate the volume of the cone. Use $\pi \approx 3.14$.

a. $\quad 301.44 \mathrm{~m}^{3}$
b. $\quad 904.32 \mathrm{~m}^{3}$
c. $\quad 37.68 \mathrm{~m}^{3}$
d. $96 \mathrm{~m}^{3}$
129. Find the volume of the figure to the nearest tenth.

130. What is the volume of a sphere with diameter 9.4 feet?
a. $\quad 434.9 \mathrm{ft}^{3}$
b. $\quad 277.6 \mathrm{ft}^{3}$
c. $\quad 69.4 \mathrm{ft}^{3}$
d. $92.5 \mathrm{ft}^{3}$
131. Given triangle $A B C$ with $a=12, C=29^{\circ}$, and $B=28^{\circ}$, find $c$. Round the answer to two decimal places.
a. $\quad 11.62$
b. 21.44
c. $\quad 12.39$
d. 6.94
132. Solve triangle $A B C$ given that $A=58^{\circ}, B=48^{\circ}$, and $b=77$.
133. Solve triangle $A B C$ given that $A=58^{\circ}, B=52^{\circ}$, and $b=62$.
a. $\quad C=250^{\circ}, a=66.72, c=73.93$
b. $\quad C=70^{\circ}, a=57.61, c=68.7$
c. $\quad C=70^{\circ}, a=66.72, c=73.93$
d. $\quad C=250^{\circ}, a=57.61, c=68.7$
134. Given triangle $A B C$ with $b=2, c=4$, and $m \angle A=118^{\circ}$, find $a$. Round the answer to two decimal places.
a. 3.53
b. 5.25
c. 3.26
d. 4.87
135. Solve $\triangle A B C$ with $A=53^{\circ}, b=59$, and $c=56$.
a. $\quad a=51.38, B=66.50^{\circ}, C=60.50^{\circ}$
b. $\quad a=52.61, B=66.50^{\circ}, C=60.50^{\circ}$
c. $\quad a=51.38, B=65.05^{\circ}, C=61.95^{\circ}$
d. $\quad a=52.61, B=65.05^{\circ}, C=61.95^{\circ}$
136. Solve triangle $A B C$ given that $a=20, b=21$, and $c=10$.

Geometry Second Semester Final Exam Review
Answer Section

1. $13 \frac{17}{31}$
2. $x=\frac{7}{2}$
3. $x=\frac{15}{14}$
4. A
5. D
6. 2400 used brand X
7. C
8. 16.9
9. The figures are not similar.
10. Yes; corresponding angles are equal in measure and ratios of corresponding sides are all equal.
11. $\frac{E C}{A C}=\frac{D C}{B C}=\frac{D E}{B A}$
12. $x=5.25, y=5.33$
13. B
14. 40 meters
15. 42 meters
16. C
17. 60 ft
18. SAS Similarity Theorem
19. AA Similarity Postulate
20. D
21. D
22. 40
23. Yes; SAS Similarity Theorem
24. 12
25. 27
26. 6
27. B
28. D
29. $\frac{14}{3}$
30. B
31. 9.592
32. D
33. $\sqrt{180} \mathrm{ft} ; 13.416 \mathrm{ft}$
34. C
35. C
36. $a=18, b=36 \sqrt{2}, h=12 \sqrt{2}$
37. 6
38. D
39. $a=8$
40. $x=5 \sqrt{3}, y=10$
41. $x=11, y=11 \sqrt{3}$
42. D
43. $x=4 \sqrt{2}$
44. $\frac{7}{24}$
45. Using the tangent ratio
$\tan A=\frac{\text { leg opposite } \angle A}{\text { leg adjacent to } \angle A}, \tan 35^{\circ}=\frac{h}{150}$.
So $h=150\left(\tan 35^{\circ}\right) \approx 150(0.7)$,
or about 105 ft .
46. B
47. $\frac{15}{17}$
48. $\sin P=\frac{8}{17}, \cos P=\frac{15}{17}, \tan P=\frac{8}{15}$
49. A. $\frac{a}{c}$
$\begin{array}{ll}\text { B. } \frac{b}{a} & \text { C. } \frac{b}{c}\end{array}$
50. 43 m
51. B
52. D
53. 5
54. 10.07

$$
\beta=70^{\circ}
$$

55. $b \approx 54.95$
$c \approx 58.48$
56. C
57. D
58. About $72.5^{\circ} \cdot \cos x=\frac{1500}{5000}$

$$
\text { so } x=\cos ^{-1}\left(\frac{1500}{5000}\right) \approx 72.5^{\circ}
$$

59. $x \approx 35 \mathrm{ft}$
60. $102^{\circ}$
61. $53^{\circ}$
62. $720^{\circ}$
63. $135^{\circ}$
64. C
65. 15
66. $72^{\circ}$
67. C
68. $(13,-8)$
69. (-2, -4)
70. A
71. $(-x, y)$
72. $(y, x)$

73. 


74.
75. Reflection
76. Reflection
77.

78. Translation
79. A
80.

81. B
82. 6

83. 1; diagrams should show the line of symmetry from the midpoint of the hypotenuse to the opposite vertex.
84. Yes, $180^{\circ}$.
85. yes; $120^{\circ}$ in either direction
86. $\sqrt{448}=8 \sqrt{7} \approx 21.2$
87. $\sqrt{425}=5 \sqrt{17} \approx 20.6$
88. C
89. B
90. A
91. 60
92. 48
93. 3
94. C
95. B
96. A
97. $56^{\circ}$
98. $32^{\circ}$
99. $68^{\circ}$
100. D
101. D
102. B
103. A
104. $16.15 \mathrm{~cm}^{2}$
105. A
106. 459 sq. units
107. 216 in. $^{2}$
108. 20 sq. units
109. 14.4 units
110. 2.62 cm
111. $\approx 322$ sq. units
112. $33.49 \mathrm{~cm}^{2}$
113. C
114. D
115. A
116. 54 in. $^{2}$
117. $(60+8 \sqrt{3}) \mathrm{cm}^{2} \approx 73.9 \mathrm{~cm}^{2}$
118. D
119. C
120. B

121.
122. $95 \mathrm{ft}^{2}$
123. A
124. B
125. D
126. C
127. $32 \mathrm{ft}^{3}$
128. A
129. $418.9 \mathrm{~mm}^{3}$
130. A
131. D
132. $C=74^{\circ}, a=87.87, c=99.6$
133. C
134. B
135. A
136. $A=70.4^{\circ}, B=81.5^{\circ}, C=28.1^{\circ}$

