

2008 Middle School Math Festival**Individual Round: Geometry**

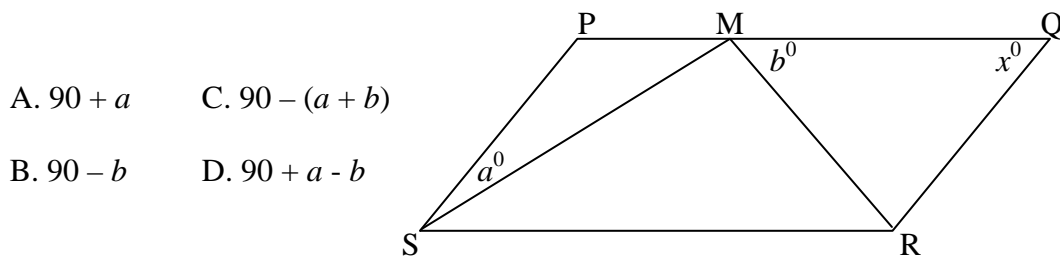
1. A straight line on a graph passes through the points (2, 5) and (4, 6). Which of the points below also lie on the line?

- A. (6, 7) B. (3, 4) C. (7, 6) D. (1, 3)

2. A rectangular rose garden measures 24 meters in length and 10 meters in width. A diagonal path through the garden divides it into two equal sections. What is the length of the path?

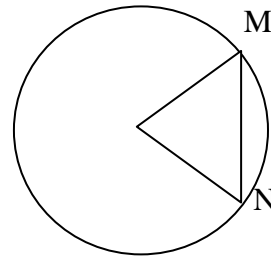
- A. 5.83 m B. 14 m C. 26 m D. 34 m

3. In the figure below, quadrilateral $PQRS$ is a parallelogram. Angle SMR is a right angle. Solve for x .



4. Inside the circle is an equilateral triangle with one vertex at the center of the circle. If the radius of the circle is 4 units long, how many units long is arc MN ?

- A. $\frac{8\pi}{3}$ C. $\frac{4\pi}{3}$
 B. $\frac{2\pi}{3}$ D. $\frac{\pi}{3}$



5. Triangle ABC with $A (-5, -2)$, $B (-3, 2)$, and $C (-1, -2)$ is reflected over the y -axis. What are the coordinates of the reflected image, in order?

- A. (5, -2), (3, 2), (1, -2) C. (5, 2), (3, -2), (1, 2)
 B. (-5, 2), (-3, -2), (1, 2) D. (-2, -5), (2, -3), (-2, -1)

6. A square pyramid has a base area of 9 ft^2 and a slant height of 8 ft. Calculate the total surface area.

- A. 48 ft^2 B. 57 ft^2 C. 96 ft^2 D. 105 ft^2

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7. A rectangular piece of fabric measures 38 by 36 inches. A triangular scarf with a height of 23 inches and a base of 30 inches is cut from the fabric. What is the area of the fabric left over?

- A. 678 in^2 B. $1,073 \text{ in}^2$ C. $1,023 \text{ in}^2$ D. $1,713 \text{ in}^2$

8. A trapezoid has an area of 160 cm^2 . The length of one base is 20 cm and the height is 10 cm. What is the length of the other base?

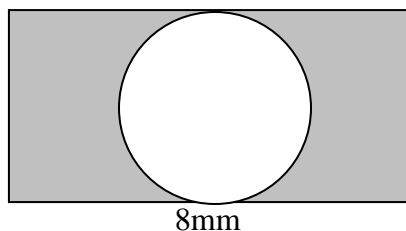
- A. 32 cm B. 6 cm C. 9 cm D. 12 cm

9. Find the diameter of a circle with a circumference of 52.7 mm. Round to the nearest tenth.

- A. 16.8 mm B. 26.4 mm C. 8.4 mm D. 33.5 mm

10. Find the area of the shaded region. The circle has a radius of 2 mm. Round to the nearest tenth.

- A. 18.3 mm^2 C. 19.4 mm^2
B. 3.4 mm^2 D. 12.6 mm^2



11. For a regular pentagon, what is the measure of each interior angle?

- A. 140° B. 270° C. 120° D. 108°

12. When Tyson opens a cereal box and lays it flat, he sees both the top and bottom measure 3 inches by 9 inches, both sides measure 3 inches by 12 inches, and the front and back both measure 9 inches by 12 inches. What is the total surface area of the cereal box?

- A. 171 in^2 B. 342 in^2 C. 306 in^2 D. 234 in^2

13. In pottery class, Felix made a 14-inch tall cylindrical vase with a 5-inch radius of the base. He wants to paint all of the outside surfaces of the vase. How many square inches will Felix have to paint? Round to the nearest whole number.

- A. 440 in^2 B. 597 in^2 C. 298 in^2 D. 518 in^2

14. A construction crew is repairing a 201-foot long section of a highway. The road is 8 feet wide and the concrete must be poured to a depth of 6 inches. How many cubic feet of concrete will be required to repair the road?

- A. $1,608 \text{ ft}^3$ B. 804 ft^3 C. 964.8 ft^3 D. $9,648 \text{ ft}^3$

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15. The ratio of corresponding dimensions of two similar solids is 2:1. The volume of the first solid is 360 m^3 . Find the volume of the second solid.

- A. $2,880 \text{ m}^3$ B. 45 m^3 C. 720 m^3 D. 180 m^3

16. Given the conditional statement “If you live in California, then you need a mountain bike,” what is the converse statement?

- A. If you do not live in California, then you do not need a mountain bike.
 B. If you need a mountain bike, then you live in California.
 C. If you do not need a mountain bike, then you do not live in California.
 D. If you live in Alaska, you do not need a mountain bike.

17. M is the midpoint of \overline{AB} . N is the midpoint of \overline{MB} . If $AB = 40$, what is the length of \overline{AN} .

- A. 5 B. 10 C. 20 D. 30

18. \overrightarrow{BC} bisects $\angle ABD$. If $m\angle ABD = 28y - 6$ and $m\angle CBD = 37 - y$, what is y ?

- A. $\frac{40}{13}$ B. $\frac{43}{29}$ C. $\frac{8}{3}$ D. $\frac{34}{13}$

19. Find the equation for the perpendicular bisector of \overline{AB} for $A(0, 0)$ and $B(4, 2)$.

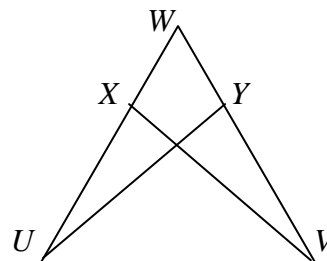
- A. $y = \frac{1}{2}x - 3$ B. $y = -2x + 5$ C. $y = -2x + 4$ D. $y = 2x - 3$

20. The three angles of a triangle are x° , $(5x)^\circ$, and $(90 - x)^\circ$. What is the positive difference between the largest and smallest angle?

- A. 18° B. 54° C. 72° D. 90°

21. $WX = WY$ and $\angle WUY \cong \angle WVX$. What congruence rule proves $\triangle UYW \cong \triangle VXW$.

- A. SAS C. ASA
 B. SSS D. AAS



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22. A circle of radius 5 is inscribed inside a square. What is the positive difference between the perimeter of the square and the circumference of the circle? Round to the nearest whole number.

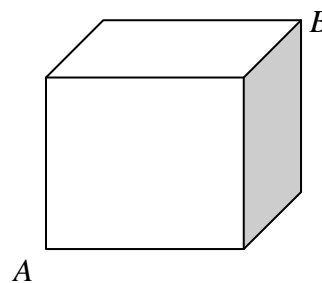
- A. 9 B. 11 C. 25 D. 39

23. A 5-meter ladder is resting against a wall. Its base is 1.8 meters away from the wall. How high up the wall does it reach? Round to the nearest tenth.

- A. 5.3 m B. 4.7 m C. 21.8 m D. 28.2 m

24. A cube has a volume of 27 in^3 . What is the diagonal distance from the lower front corner A to the opposite upper corner B ?

- A. 9 in. C. $3\sqrt{3}$ in.
B. 27 in. D. $3\sqrt{2}$ in.

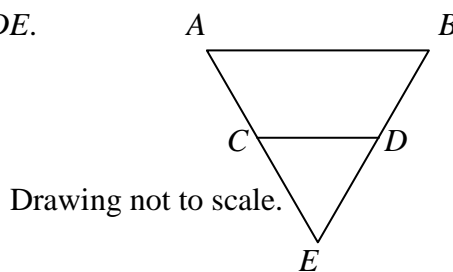


25. Find the area of a square with a diagonal of length 18 inches.

- A. 18 in^2 B. $9\sqrt{2} \text{ in}^2$ C. 324 in^2 D. 162 in^2

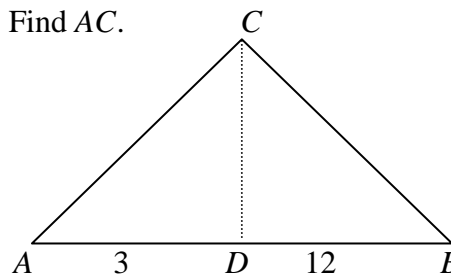
26. $AB \parallel CD$. $AB = 42$; $BD = 20$; $CD = 12$. Find DE .

- A. 8 C. 28
B. $\frac{126}{5}$ D. $\frac{40}{7}$



27. \overline{CD} is the altitude to the hypotenuse of right triangle ABC . Find AC .

- A. $6\sqrt{5}$ C. $3\sqrt{5}$
B. 6 D. 36



Drawing not to scale

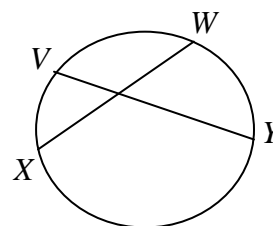
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28. If $\cos A = \frac{15}{17}$, what is $\sin A$?

- A. $\frac{8}{15}$ B. $\frac{8}{17}$ C. $\frac{15}{17}$ D. $\frac{15}{64}$

29. Point Q is at the intersection of \overline{XW} and \overline{VY} . $m\angle XY = 200^\circ$ and $m\angle VW = 66^\circ$. Find $m\angle XQY$.

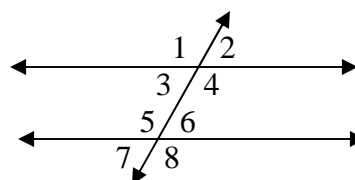
- A. 266° C. 134°
 B. 67° D. 133°



Drawing not to scale

30. $m \parallel n$. If $m\angle 1 = 6x - 5$ and $m\angle 7 = 2x + 5$, find $m\angle 1$.

- A. 22.5° C. 50°
 B. 45° D. 130°

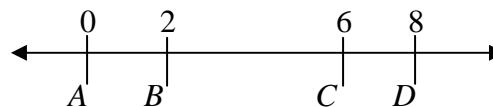


Drawing not to scale

31. Two supplementary angles have a ratio of 3:2. What is the measure of the larger angle?

- A. 36° B. 72° C. 108° D. 130°

32. Point X (not shown) on the number line is three units from Point C and 7 units from Point B . Where is Point X located?



- A. Between A and B C. To the right of D
 B. Between C and D D. Between B and C

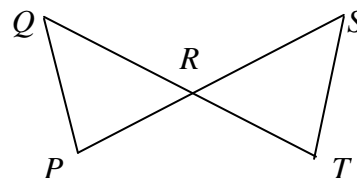
33. Which of the following statements is *false*?

- A. An isosceles triangle must have three acute angles.
 B. All circles are similar
 C. A square is a rectangle with four congruent sides.
 D. All squares are parallelograms.

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34. $\overline{QR} \cong \overline{SR}$ and $\overline{PR} \cong \overline{TR}$. What congruence rule proves $\triangle QPR \cong \triangle STR$.

- A. SAS C. ASA
 B. AAS D. SSS

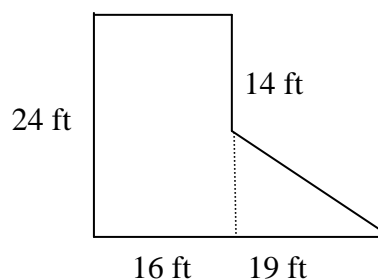


35. Classify the triangle with sides measuring 3, 5, and 6.

- A. acute B. right C. obtuse

36. Find the area of the figure to the right. It is not drawn to scale.

- A. 424 ft^2 C. 412 ft^2
 B. 479 ft^2 D. 574 ft^2



37. If E and F are points, which is a number?

- A. \overline{EF} B. \overline{EF} C. \overline{EF} D. EF

38. Triangle ABC with $A (-5, -2)$, $B (-3, 2)$, and $C (-1, -2)$ is transformed 3 units left and 8 units up. What are the coordinates of the transformed image, in order?

- A. $(-8, -10)$, $(-6, -6)$, $(-4, -10)$ C. $(3, -5)$, $(5, -1)$, $(7, -5)$
 B. $(-8, 6)$, $(-6, 10)$, $(-4, 6)$ D. $(-2, -10)$, $(0, -6)$, $(2, -10)$

39. One leg of a right triangle is 11 and the hypotenuse is 61. What is the perimeter of the triangle? Round to the nearest whole number.

- A. 83 B. 122 C. 132 D. 134

40. Equilateral triangle ABC is inscribed inside a circle. What is measure of arc AB ?

- A. 120° C. 30°
 B. 60° D. 240°

