NAME _____ SCHOOL _____

2010 Middle School Math Festival **Individual Round: Geometry**

1. What is the equation of the line parallel to the line 10x + 15y – 9 = 0 that passes through the point (9, -2).

A. $y = -\frac{2}{3}x + 4$ B. $y = -\frac{2}{3}x - 8$ C. $y = \frac{3}{2}x + \frac{23}{2}$ D. $y = -\frac{2}{3}x - \frac{31}{3}$

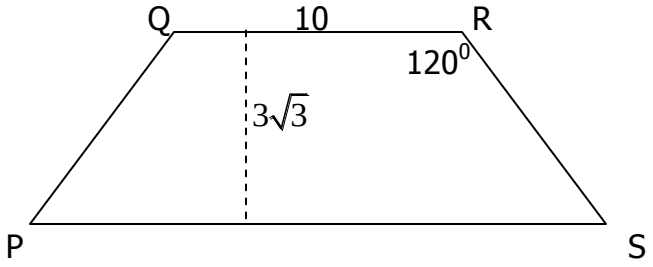
2. A rectangular rose garden has a width of 51 feet and the diagonal path measuring 85 feet divides the garden into two equal sections. What is the length of the garden, measured to the nearest foot?

A. 15 ft B. 34 ft C. 68 ft D. 99 ft

3. In the figure below, *PQRS* is an isosceles trapezoid. What is the exact perimeter?

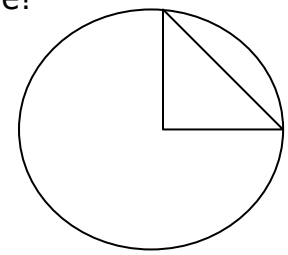
A. 32 C. $20 + 6\sqrt{3}$

B. 38 D. $39\sqrt{3}$



4. Inside the circle is an isosceles right triangle with one vertex at the center of the circle. The area of the circle is 6π. What is the area of the triangle?

A. 3 B. 6 C. 18 D. 36



5. Triangle *ABC* with *A* (-5, -2), *B* (-3, 2), and *C* (1, -2) is reflected over the *x*-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)

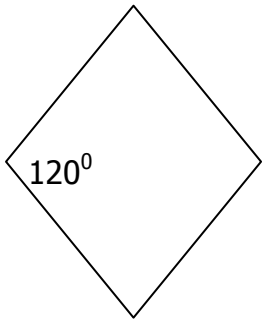
6. The volume of a pyramid is given by the equation: $V = \frac{1}{3}Bh$, where B = the area of the base and h = the height of the pyramid. A square right pyramid with a volume of 400 in^3 has a height of 12 inches. What is the slant height of the pyramid?

A. $\sqrt{119}$ B. $2\sqrt{61}$ C. 17 D. 13

7. A rectangular piece of fabric measures 2 meters by 3 meters. You plan to cut out some right triangular shapes, each with an area of 150 cm^2. How many triangular shapes can be cut out?

A. 800 B. 400 C. 80 D. 1600

8. The rhombus at the right has a perimeter of 32. What is the area?



A. 64 B. $16\sqrt{3}$ C. $32\sqrt{3}$ D. $64\sqrt{3}$

9. A circle with an area of 6.25π mm^2. What is its circumference of the circle?

A. 10π mm B. 5π mm C. 2.5π mm D. 3.125π mm

10. A circle is inscribed within a square. The diagonal of the square is $\sqrt{6}$. What is the area of the circle, in terms of π ?

A. 12π B. 3π C. $\frac{3}{2}\pi$ D. $\frac{3}{4}\pi$

11. For a regular 15-gon, what is the measure of each interior angle?

A. 24^0 B. 144^0 C. 156^0 D. 312^0

12. The total surface area of a triangular prism is given by the formula, SA = $2B + ph$, where B = area of the triangular base, p = perimeter of the triangular base, and h = prism height (distance between the two triangular bases). A triangular prism has a base of a right triangle at each end with legs of 8 and 15 feet and a prism height of 12 feet. What is the total surface area?

A. 300 ft^2 B. 540 ft^2 C. 600 ft^2 D. 720 ft^2

13. A right circular cylinder has a diameter of $\sqrt{80}$ and a height of 7. What is the volume, in terms of π ?

A. 280π B. 140π C. 180π D. 70π

14. A rectangular prism has dimensions of 1 meter by 10 centimeters by 100 millimeters. What is the total surface area, in square millimeters?

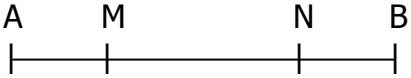
A. 420,000 mm^2 B. 1000 mm^2 C. 1,000,000 mm^2 D. 10,000,000 mm^2

15. For two similar polygons, shape A has a total surface area of 80 in^2 while shape B has a total surface area of 125 in^2. The perimeter of shape A is 32 inches. What is the perimeter of the shape B?

A. 6.25 in. B. 25.6 in. C. 40 in. D. 77 in.

16. Given the conditional statement "If a parallelogram has four congruent sides, then the polygon is a rhombus," what is the inverse statement?

A. If the polygon is a rhombus, then the polygon is a parallelogram.
B. If the polygon is not a rhombus, then the polygon is not a parallelogram.
C. If a parallelogram does not have four congruent sides,
then the polygon is not a rhombus.
D. If the parallelogram has four congruent sides,
then the polygon is not a rhombus.

17. 

$AM \cong NB$. If $AN = 7$ and $AB = 12$, what is MN?

Drawing not to scale.

A. 2 B. 4 C. 5 D. 19

18. $\overline{BC}$ bisects $\angle ABD$. If $m\angle ABC = 3y+5$ and $m\angle ABD = 22y - 6$, what is $m\angle ABD$?

A. 1^0 B. 5^0 C. 8^0 D. 16^0

19. Find the equation for the perpendicular bisector of $\overline{AB}$ for *A* (2, -1) and *B* (-2, 3).

A. y = x B. y = x + 1 C. y = -x + 1 D. y = 2x + 1

20. The measure of three angles of a triangle have a proportion of 2:3:4. What is the measure of the largest angle?

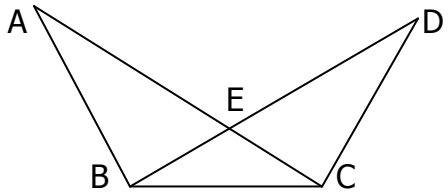
A. 40^0 B. 45^0 C. 60^0 D. 80^0

21. $m\angle A \cong m\angle D$ *and* $m\angle EBC \cong m\angle ECB$. What congruence rule proves $\Delta ABC \cong \Delta DCB$.

A. SAS C. ASA

B. AAA D. AAS

Drawing not to scale.



22. A square is inscribed inside a circle. If the area of the circle is 8π, what is the perimeter of the square?

A. 32 B. 16 C. 8 D. 4

23. A ladder reaches to a height of 6 feet. Its base is 30 inches away from the wall. What is the length of the ladder?

A. 30.5 ft. B. 8.5 ft. C. 6.5 ft. D. 5.5 ft

24. A cube container has a total surface area of 72 cm^2. What is the exact volume of the cube, measured in cm^3?

A. $24\sqrt{3}$ cm^3 B. 144 cm^3 C. $432\sqrt{2}$ cm^3 D. 1728 cm^3

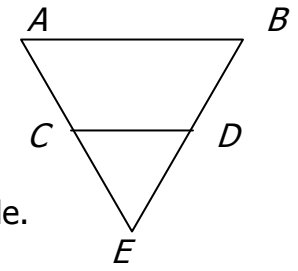
25. The diagonal of a square is $\sqrt{5}$ inches long. What is the area of the square, measured in square inches?

A. 10 in^2 B. 6.25 in^2 C. 5 in^2 D. 2.5 in^2

26. Segment AB is parallel to segment CD. If CD = 8, BD = 10, and DE = 5. What is the length of AB?

A. 24 C. 9.375

B. 16 D. 6.25



Drawing not to scale.

27. The following sequence is a geometric sequence: 8 , ___ , ___ , ___ , 128. What is the 2nd term in the sequence?

A. 16 B. 30 C. 32 D. 38

28. In Quadrant I, if $\tan A = \frac{15}{8}$, what is $\cos A$?

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

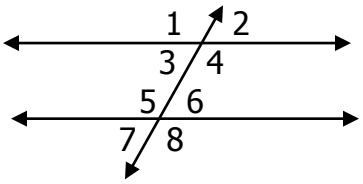
29. In parallelogram ABCD, the $m\angle A = 2x + 15$ *and* $m\angle B = 3x + 15$, what is the measurement of angle D?

A. 30^0 B. 51^0 C. 75^0 D. 105^0

30. Lines m and n are parallel. If $\text{m}\angle 2 = 5x + 30$ and $\text{m}\angle 8 = 30x - 25$, find $\text{m}\angle 1$.

A. 41^0 C. 65^0

B. 125^0 D. 5^0

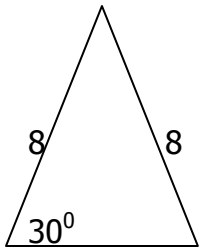


Drawing not to scale

31. Two angles are complementary. One angle is 6^0 less than the twice the other angle. What is the measurement of the larger angle?

A. 32^0 B. 58^0 C. 62^0 D. 118^0

32. What is the exact area of the isosceles triangle to the right?



A. $8\sqrt{3}$ C. $16\sqrt{2}$

B. $16\sqrt{3}$ D. 32

33. You have 200 feet of fencing. What is the largest area you could enclose?

A. 20,000 ft^2 B. 10,000 ft^2 C. 2,500 ft^2 D. 1,250 ft^2

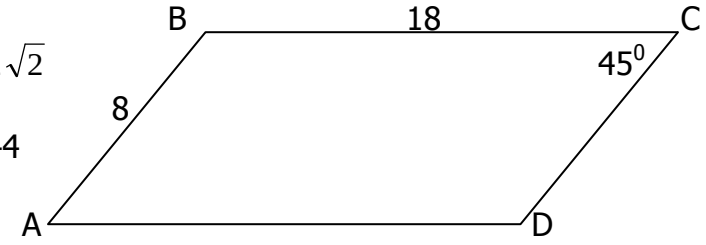
34. Two sides of a triangle have lengths 2 and 3. What are the possible integer lengths for the third side?

A. {1, 2, 3, 4, 5} B. {2, 3, 4} C. {4, 5} D. {4}

35. Classify the triangle with sides measuring 5, 6, and 9.

A. Obtuse B. Right C. Acute D. Isosceles

36. In the figure below, quadrilateral *ABCD* is a parallelogram. Calculate the exact area of the parallelogram.



A. $52\sqrt{2}$ C. $72\sqrt{2}$

B. 32 D. 144

37. Simplfy: $\sqrt{175} + \sqrt{28} + \sqrt{63}$

A. $10\sqrt{21}$ B. $38\sqrt{7}$ C. $\sqrt{266}$ D. $10\sqrt{7}$

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

A. (-13, -5), (-11, -1), (-9, -5)

C. (3, -5), (5, -1), (7, -5)

B. (3, 1), (5, 5), (7, 1)

D. (-13, 1), (-11, 5), (-9, 1)

39, One leg of a right triangle is $\sqrt{12}$ and the hypotenuse is $\sqrt{20}$. What is the exact length of the other leg?

A. $2\sqrt{2}$ B. $4\sqrt{2}$ C. $4\sqrt{15}$ D. $\sqrt{15}/3$

40. What is the exact distance between (-10, 3) and (30, -6)?

A. $\sqrt{409}$ B. $7\sqrt{31}$ C. 7 D. 41