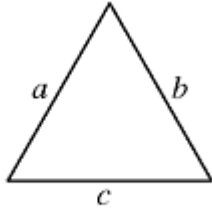


1.



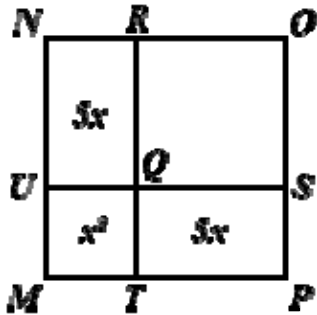
Note: Figure not drawn to scale.

If two sides of the triangle above have lengths 5 and 6, the perimeter of the triangle could be which of the following?

- I. 11
- II. 15
- III. 24

- A) I only
- B) II only
- C) III only
- D) II and III only
- E) none of the above

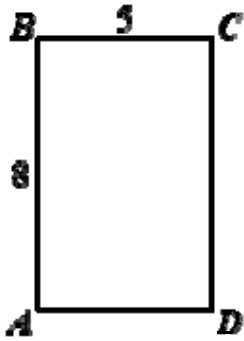
2.



The figure above shows a square region divided into four rectangular regions, three of which have areas $5x$, $5x$ and x^2 , respectively. If the area of $MNOP$ is 64, what is the area of square $QROS$?

- A) 9
- B) 16
- C) 25
- D) 36
- E) none of the above

3.



If the rectangle $ABCD$ in the figure above is rotated about side AB , it generates a cylinder of volume

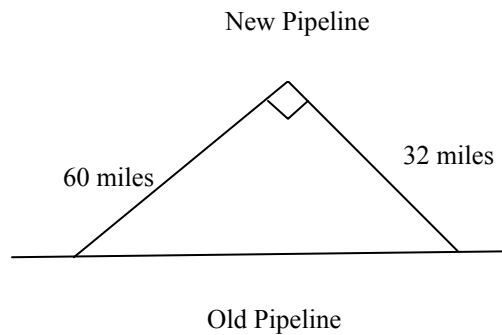
- A) 40π
- B) 50π
- C) 100π
- D) 200π
- E) none of the above

4. 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 bases.
- E) none of the above

5. If a cylindrical barrel measures 22 inches in diameter, how many inches will it roll in 8 revolutions along a smooth surface?
- A) 121π inches
 - B) 168π inches
 - C) 176π inches
 - D) 228π inches
 - E) none of the above

6. A new pipeline is being constructed to re-route its oil flow around the exterior of a national wildlife preserve. The plan showing the old pipeline and the new route is shown below.

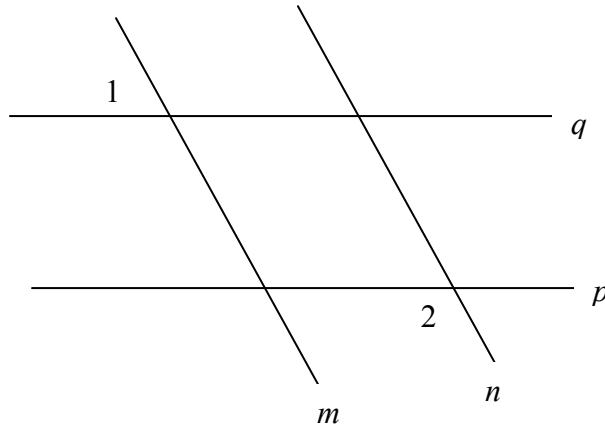


- About how many extra miles will the oil flow once the new route is established?
- A) 24 miles
 - B) 68 miles
 - C) 92 miles
 - D) 160 miles
 - E) none of the above

7. Marigolds are to be planted inside a circular flower garden so that there are 4 marigolds per square foot. The circumference of the garden is 20 feet. If marigolds are available only in packs of 6, how many packs of 6 flowers are needed?

- A) 22 packs
- B) 20 packs
- C) 14 packs
- D) 13 packs
- E) none of the above

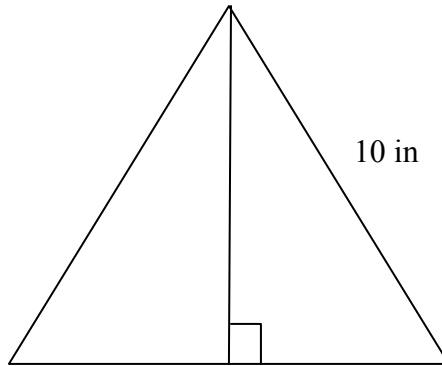
8. Given that, in the diagram below, $p \parallel q$, $m \parallel n$ and $m\angle 1 = 75^\circ$,



What is $m\angle 2$?

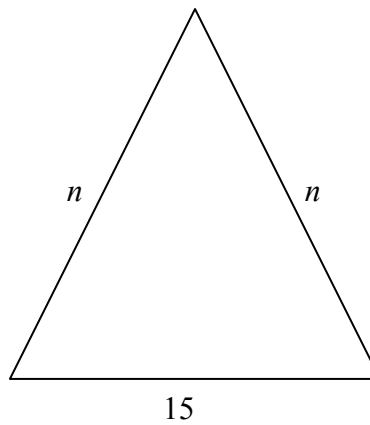
- A) 15°
- B) 75°
- C) 90°
- D) 105°
- E) none of the above

9. What is the area, in square inches (in^2), in the equilateral triangle below?



- A) 25 in^2
- B) $25\sqrt{3} \text{ in}^2$
- C) 50 in^2
- D) $50\sqrt{3} \text{ in}^2$
- E) none of the above

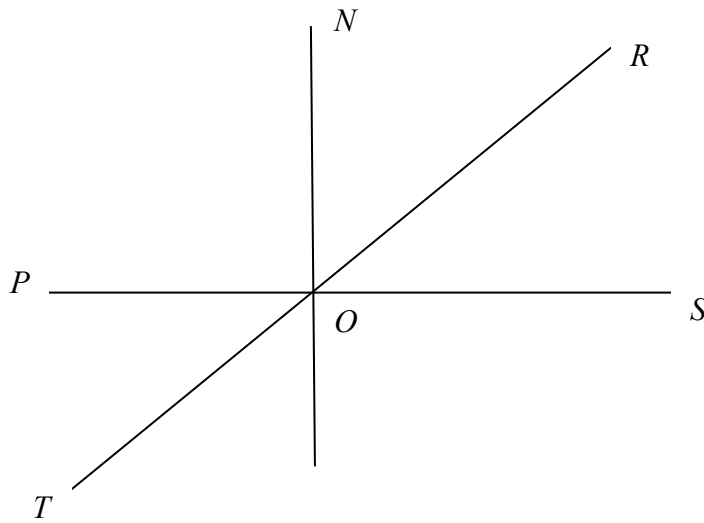
10. In the figure below, n is a whole number. What is the smallest possible value for n ?



- A) 1
- B) 7
- C) 14
- D) 8
- E) none of the above

11. In triangle $\triangle ABC$, the altitude through B intersects side AC at point D . Angle $BAD = \text{angle } ABD$. If $AD = 1$ and $DC = \sqrt{3}$, what is the measure of angle BCD in degrees?

- A) 15
- B) 25
- C) 30
- D) 35
- E) none of the above



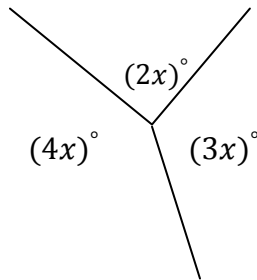
12. In the figure above, \overline{PS} and \overline{TR} intersect at O and \overline{ON} is perpendicular to \overline{PS} . If angle $TOS = y^\circ$, angle $POT = 20^\circ$, and angle $NOR = x^\circ$, what is the value of $y - x$?

- A) 20
- B) 70
- C) 90
- D) 100
- E) none of the above

13. A certain triangle has two angles that have the same measure. If the lengths of two of the sides of the triangle are 50 and 30, what is the least possible value for the perimeter of the triangle?

- A) 130
- B) 110
- C) 100
- D) 80
- E) none of the above

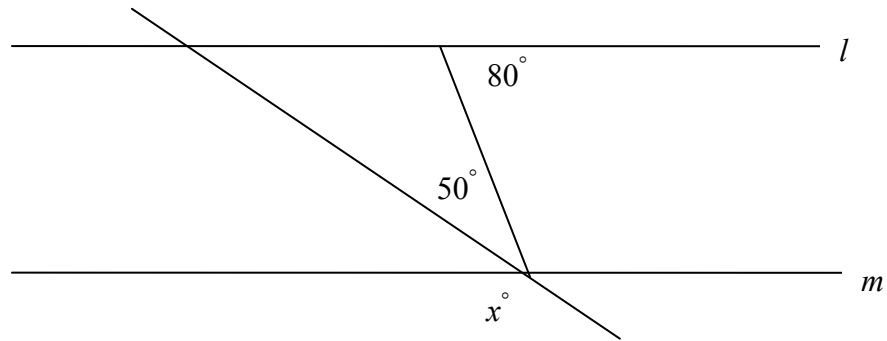
14.



In the figure above, three line segments meet at a point to form three angles. What is the value of x ?

- A) 20
- B) 36
- C) 40
- D) 60
- E) none of the above

15.



- In the figure above, line l is parallel to line m . What is the value of x ?
- A) 150
 - B) 140
 - C) 130
 - D) 110
 - E) none of the above

16. For how many ordered pairs of positive integers (x, y) is $2x + 3y < 6$?
- A) five
 - B) three
 - C) two
 - D) one
 - E) none of the above

17. In the xy – coordinate plane, the distance between point $B(10, 18)$ and point $A(x, 3)$ is 17. What is one possible value of x ?

A) 5

B) 4

C) 2

D) 1

E) none of the above

18. How many cubical blocks, each with edges of length 4 centimeters, are needed to fill a rectangular box that has inside dimensions 20 centimeters by 24 centimeters by 32 centimeters?

A) 38

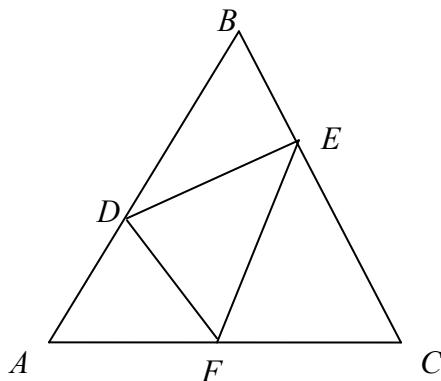
B) 96

C) 192

D) 240

E) none of the above

19.



In the figure above, $AB = BC$ and triangle DEF is equilateral. If the measure of angle ABC is 30° and the measure of angle BDE is 50° , what is the measure of angle DFA in degrees?

- A) 30°
- B) 35°
- C) 40°
- D) 45°
- E) none of the above

20. Two triangles $\triangle ABC$ and $\triangle DEF$ have equal perimeters. In triangle $\triangle DEF$, $DE = 4$, $EF = 8$, and $DF = 9$. If triangle $\triangle ABC$ is equilateral, what is the length of AB ?

- A) 4
- B) 5
- C) 7
- D) 9
- E) none of the above

21. If the volume of a cube is 8, what is the shortest distance from the center of the cube to the base of the cube?

A) 1

B) 2

C) 3

D) 4

E) none of the above

22. Tickets for the school play cost \$3 for students with student-body cards and cost \$5 for all others. The school sold 234 tickets and collected \$898. How many students with student body cards bought tickets?

A) 136

B) 98

C) 123

D) 111

E) none of the above

23. A cathedral tower 200 ft high is 250 ft from a church that is 150ft high. At the same instance, two crows, one from each tower, fly off at the same speed heading toward some grain that is on a level, straight road located between the towers. The crows reach the grain at the same instant. How far is the grain from the foot of the cathedral tower?

- A) 45 ft
- B) 90 ft
- C) 160 ft
- D) 80 ft
- E) none of the above

24. If \overrightarrow{BD} is the angle bisector of $\angle ABC$, and if \overrightarrow{BE} is the angle bisector of $\angle ABD$, what is the $m\angle ABC$ if $m\angle DBE = 36^\circ$.

- A) 27°
- B) 32°
- C) 36°
- D) 45°
- E) none of the above

25. If D is the midpoint of \overline{AC} and C is the midpoint of \overline{AB} , what is the length of \overline{AB} if $AD = 3\text{cm}$?

- A) 6 cm
- B) 9 cm
- C) 12 cm
- D) 10 cm
- E) none of the above

26. Each person at a party shook hands with everyone else exactly once. There were 66 handshakes. How many people were at the party?

- A) 10
- B) 11
- C) 12
- D) 13
- E) none of the above

27. How many sides does a polygon have if it has 495 diagonals?

- A) 33
- B) 30
- C) 25
- D) 23
- E) none of the above

28. Find the equation of the perpendicular bisector of the segment with endpoints (1,3) and (9,15).

- A) $y = -\frac{2}{3}x + \frac{37}{3}$
- B) $y = -\frac{2}{3}x - \frac{17}{3}$
- C) $y = \frac{2}{3}x - \frac{17}{3}$
- D) $y = \frac{2}{3}x - \frac{37}{3}$
- E) none of the above

29. The floor plan of a house is drawn to the scale of $\frac{1''}{4} = 1'$. The master bedroom measures $3''$ by $3\frac{3}{4}''$ on the blueprints. What is the actual size of the room?

- A) $12' \times 15'$
- B) $15' \times 12'$
- C) $12' \times 20'$
- D) $12' \times 36'$
- E) none of the above

30. If a 425-pound lunar vehicle weighs 68 pounds on the moon, how much does a 150-pound astronaut weigh on the moon?

- A) 24 lbs
- B) 900 lbs
- C) 28 lbs
- D) 40 lbs
- E) none of the above

31. The diameter AB of a circle is 8 inches. A triangle is drawn with AB as the base and the third vertex is on the circle. One side of the triangle is 6 inches. What is the length of the third side?

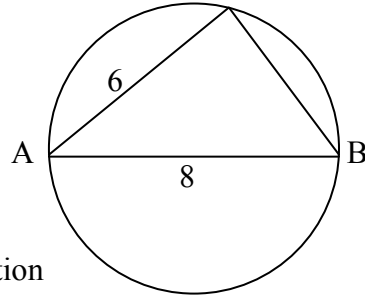
A) $2\sqrt{12}$ inches

B) 7 inches

C) $2\sqrt{7}$ inches

D) $\sqrt{12}$ inches

E) Cannot be determined without further information



32. In the figure we are given $AC \perp DB$, $AD \cong DC$, $AB \cong BC$
 $m\angle DAC = 70^\circ$, $m\angle DAB = 110^\circ$. Find $m\angle ABD$.

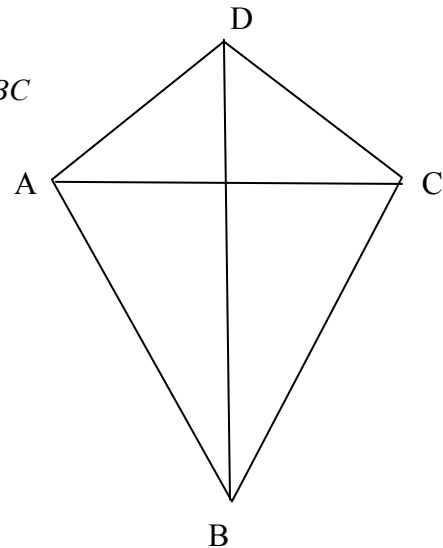
A) 20°

B) 50°

C) 40°

D) 60°

E) none of the above



33. An equilateral triangle has side length 4 inches. Find the radius of the circumscribed circle.

A) $\frac{8}{3}$ in

B) $\frac{2\sqrt{3}}{3}$ in

C) $\sqrt{3}$ in

D) $\frac{4\sqrt{3}}{3}$ in

E) none of the above

34. Sue left Town A and traveled north 20 miles. She then rode east to Town B, a distance of 30 miles. Bob rode directly from Town A to Town B. How much farther did Sue travel than Bob?

A) $50 - 10\sqrt{13}$ miles

B) $25 - 10\sqrt{13}$ miles

C) $5\sqrt{2} - 6\sqrt{13}$ miles

D) $50 - 10\sqrt{5}$ miles

E) none of the above

35. The bases of an isosceles trapezoid are 10 and 18. If its legs are 5 each, find its area.

- A) 42
- B) 56
- C) 62
- D) 84
- E) none of the above

36. A 25-foot ladder is placed against a vertical wall of a building. The foot of the ladder is 7 feet from the base of the building. If the top of the ladder slips 4 feet, then the foot of the ladder will slide:

- A) 4 ft
- B) 5 ft
- C) 8 ft
- D) 9 ft
- E) none of the above

37. A rectangular box measures $6 \times 4 \times 2$ feet. What is the length of the longest stick that can fit into the box?

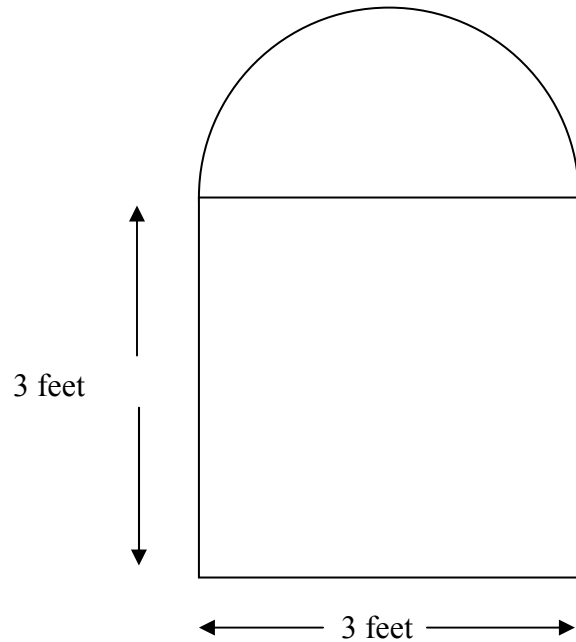
- A) $\sqrt{14}$ ft.
- B) $14\sqrt{2}$ ft.
- C) $2\sqrt{7}$ ft.
- D) $2\sqrt{14}$ ft.
- E) none of the above

38. Let C be a circle of radius r feet. Let C_1 be a concentric circle with radius $r+3$ feet. Compute the difference in the circumferences of the two circles.

- A) 3 ft
- B) 6 ft
- C) 6π ft
- D) 3π ft
- E) Not enough information

39. The top of a window is a semi-circle. The bottom part of the window is a square with sides equal to three feet. What is the perimeter around the window?

- A) $9 + 3\pi$ ft
- B) $9 + \frac{3}{2}\pi$ ft
- C) $9 + \frac{9}{4}\pi$ ft
- D) $9 + 6\pi$ ft
- E) $9 + 9\pi^2$ ft



40. A round pizza 20 inches in diameter is sliced into eight equal pieces. What is the area of each slice?

- A) $25\pi/2$ in²
- B) 50π in²
- C) $5\pi/4$ in²
- D) $5\pi/2$ in²
- E) $25\sqrt{3}\pi/2$ in²