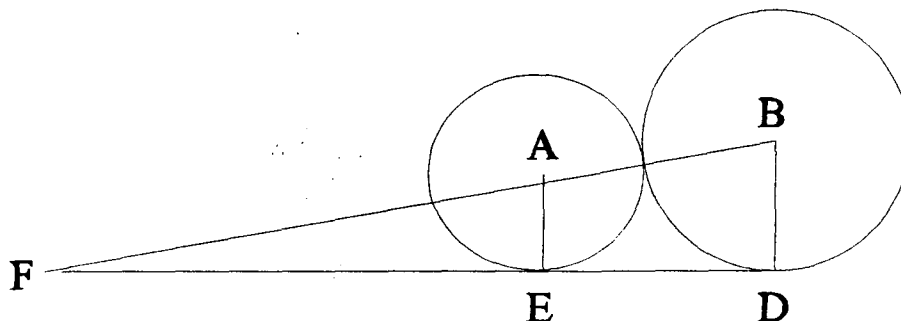


For all questions, answer E. "NOTA" means none of the above.
 Figures not drawn to scale.

1. In the following figure, circles A and B are tangent externally and \overline{DE} is a common tangent. If $AE = 4$ and $BD = 6$, find AF .

- A. 5
- B. 9
- C. 16
- D. 20
- E. NOTA

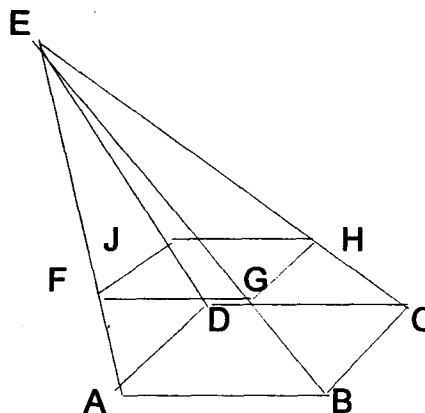


2. In the pyramid at the right,

$$\overline{FG} \parallel \overline{AB} \text{ and } \overline{GH} \parallel \overline{BC},$$

$AF = 2$, $FE = 4$, $EH = 5$, $FG = 3$
 and $BG = 3$.

Find the sum of GE and HC and
 the perimeter of triangle ABE .



- A. 21.5
- B. 23.5
- C. 28
- D. 35.5
- E. NOTA

3. Point M is the midpoint of PQ. Which of these is not true?

- A. $PQ = 2PM$
- B. $PM + MQ = PQ$
- C. $MQ = \frac{1}{2}PQ$
- D. PM & PQ are opposite rays
- E. NOTA

4. A cake in the shape of a right circular cylinder is placed (inscribed) into a box in the shape of a right square prism of the same height. Both the radius and the altitude of the cake and box are each 30 cm long. What is the ratio of the total volume of the box to the total volume of the cake. (Leave in terms of π .)

- A. $1:4\pi$
- B. $2:\pi$
- C. $4:\pi$
- D. $8:\pi$
- E. NOTA

For all questions, answer E. "NOTA" means none of the above.
 Figures not drawn to scale.

5. The measure of the supplement of $\angle 1$ is six times the measure of a complement of $\angle 1$. Find the product of the complement and its supplement.
- A. 1296 B. 1944 C. 7776 D. 180 E. NOTA
6. A wedding cake has three circular tiers stacked on top of each other, each 4 inches high. The tiers have diameters of 30 in., 24 in., and 18 in. What is the surface area to be covered by frosting if there is no frosting between layers or on the bottom? (Use $\pi = 3.14$ and round to nearest whole square inch.)
- A. 3495 in² B. 2600 in²
 C. 1161 in² D. 1611 in² E. NOTA
7. Which of the following lines is **not** perpendicular to the line $y = (3/2)x + 8$?
- A. $2x + 3y = 1$ B. $4x = 3 - 6y$ C. $x = -1.5y$
 D. $24 = 2x - 3y$ E. NOTA
8. Find the quotient of the number of sides in a dodecagon and hexagon; increase this number by the quotient of the sum of the angles in an icosagon and the sum of the angles in an octagon. The product of this answer and 8 is:
- A. 5 B. 32 C. 40 D. 1080 E. NOTA
9. When proving the Exterior Angle Theorem, steps 1, 2, and 3 are shown below. What reason would be given for step 3?

Statements	Reasons
1) $m\angle 1 + m\angle 4 = 180$	1) Angle Addition Postulate
2) $m\angle 2 + m\angle 3 + m\angle 4 = 180$	2) Triangle Angle Sum Theorem
3) $m\angle 1 + m\angle 4 = m\angle 2 + m\angle 3 + m\angle 4$	3) _____ ?

A. Subtraction Property of Equality B. Substitution Property
 C. Transition Property D. Symmetric Property
 E. NOTA

For all questions, answer E. "NOTA" means none of the above.
 Figures not drawn to scale.

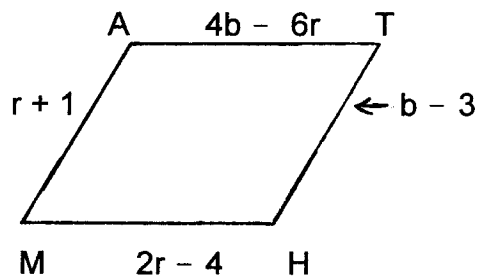
10. Find the probability that the measure of an interior angle of a regular n -gon is a positive integer such that n is an integer and $3 \leq n \leq 12$.

A. $\frac{2}{5}$ B. $\frac{1}{2}$ C. $\frac{9}{10}$ D. $\frac{4}{5}$ E. NOTA

11. A cylinder 4 inches in diameter and 6 inches high holds one lb. of oatmeal. To the nearest ounce, how much oatmeal will a similar 10-inch high cylinder hold?

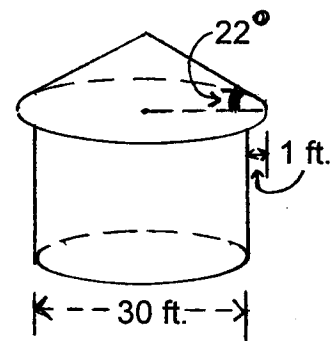
A. 5 B. 28 C. 74 D. 107 E. NOTA

12. Given rhombus MATH with sides as marked. Find $b \times r$.



A. 54 B. 36 C. 45 D. 63 E. NOTA

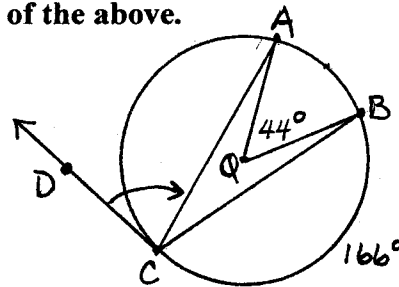
13. Jane is planning to build a new grain silo with a diameter of 30 feet. She reads that the recommended slope of the roof is 22 degrees. She wants the roof to overhang the edge of the silo by 1 foot. What should the slant height of the roof be? Give your answer to the nearest foot.



A. 15 ft. B. 16 ft. C. 17 ft. D. 33 ft. E. NOTA

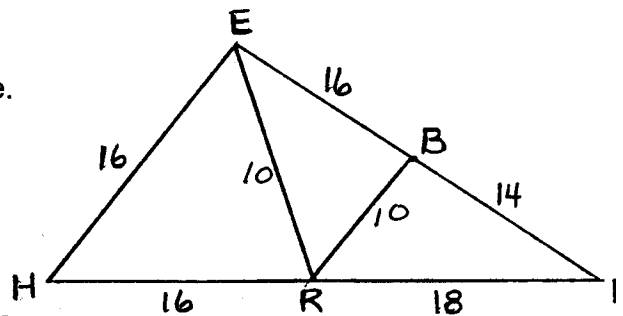
For all questions, answer E. "NOTA" means none of the above.
 Figures not drawn to scale.

14. Find the $m\angle ACD$.



- A. 22 B. 75 C. 150 D. 166 E. NOTA

15. The triangle at the right is not drawn to scale.
 Find the area of triangle HEP if
 $HR = HE = BE = 16$; $ER = BR = 10$;
 $PB = 14$ AND $PR = 18$.



- A. 40 B. 80 C. 240
 D. 480 E. NOTA

16. The area A of a trapezoid varies jointly as the height h and the sum of its bases b_1 and b_2 . Find the equation of joint variation if $A = 48 \text{ in}^3$, $h = 8 \text{ in.}$, $b_1 = 5 \text{ in.}$, and $b_2 = 7 \text{ in.}$

- A. $A = 0.5/[h(b_1 + b_2)]$ B. $A = 4608/[h(b_1 + b_2)]$
 C. $A = 0.5h(b_1 + b_2)$ D. $A = 4608h(b_1 + b_2)$ E. NOTA

17. Find the perimeter of a quadrilateral with vertices at $(4,5)$, $(-4,6)$, $(-5,-8)$, and $(6,3)$.

- A. $52\sqrt{66}$ B. $14 + 13\sqrt{2} + 13\sqrt{5}$
 C. $13\sqrt{2} + \sqrt{65} + \sqrt{197}$ D. $27 + 13\sqrt{2}$ E. NOTA

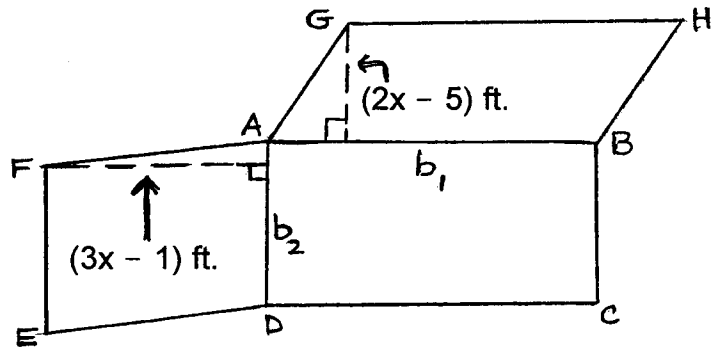
18. Find the product of the x and y coordinates of the midpoint of AB with endpoints A $(5,5)$ and B $(6, -7)$.

- A. $-\frac{11}{2}$ B. -3 C. $\frac{11}{2}$ D. 3 E. NOTA

For all questions, answer E. "NOTA" means none of the above.
 Figures not drawn to scale.

19. The bases of two parallelograms are also adjacent sides of a rectangle ABCD. Parallelogram AGHB has an area of $12x^2 + 2x - 2$ square feet and height of $2x - 5$ feet. Parallelogram ADEF has a area of $2x^2 - 3x - 5$ square feet and height of $3x - 1$ feet. Find the area of rectangle ABCD.

- A. $2x^2 - x + 1$
- B. $2x^2 + 3x + 1$
- C. $4x^2 - 2x + 2$
- D. $4x^2 + 6x + 2$
- E. NOTA



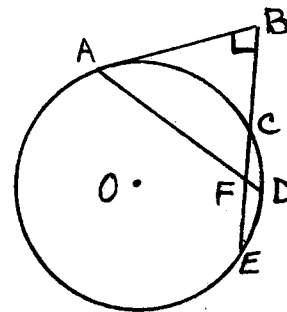
20. The lengths of the sides of a right triangle can be expressed as $x + 2$ in., $x + 9$ in., and $x + 10$ in. ($x > 0$). Find the area of the triangle.

- A. 6 in^2
- B. $6\sqrt{3} \text{ in}^2$
- C. 30 in^2
- D. 60 in^2
- E. NOTA

21. Two chords of a circle intersect internally. The segments of the first chord are 16 cm and 18 cm long. The lengths of the segments of the second chord are in a ratio of 2:1. Find the total length of the second chord.

- A. 12
- B. 24
- C. 38
- D. 144
- E. NOTA

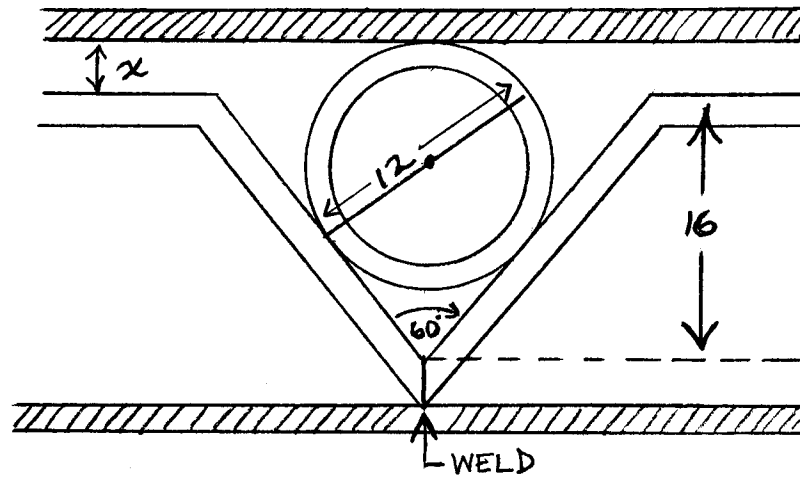
22. \overline{AB} is tangent to circle O at A.
 $\overline{AB} \perp \overline{EB}$. $AB = BF$, $BC = 1$,
 and $CE = 7$. Find AF.



- A. 2
- B. $3\frac{1}{2}$
- C. 4
- D. $4\frac{1}{3}$
- E. NOTA

For all questions, answer E. "NOTA" means none of the above.
 Figures not drawn to scale.

23. A 12 inch (diameter) pipe is resting tangent to two pieces of angle-iron metal which have been welded together to make an angle of 60 degrees as shown. A piece of sheet metal lies parallel to the ground and tangent to the same pipe (see figure). Find the measure of the opening indicated by x .



- A. 1.5 in. B. 2 in. C. 2.5 in. D. 3 in. E. NOTA
24. Find the coordinates of the point that is three-fourths of the way from $P(-1, 12)$ to $Q(5, -10)$.
- A. (2, 1) B. (1, 2)
 C. $(-\frac{9}{2}, \frac{7}{2})$ D. $(\frac{7}{2}, -\frac{9}{2})$ E. NOTA
25. Solve the following for x . If x is the value of one leg of a 45-45-90 triangle, find the hypotenuse.
- $$\text{Log}_3(2x - 1) + \text{Log}_3(x - 2) = 3$$
- A. 10 B. $5\sqrt{3}$ C. $5\sqrt{2}$ D. 5 E. NOTA
26. Triangle VHI has vertices $V(5, -2)$, $H(-3, 4)$, and $I(-2, -3)$. Find the perimeter of triangle MTV if its perimeter is 3 times that of triangle VHI's perimeter.
- A. $10 + 30\sqrt{2}$ B. $30 + 30\sqrt{2}$
 C. $10 + 10\sqrt{2}$ D. $30 + 10\sqrt{2}$ E. NOTA

