

NOTA means "None of these answers."

9

1. Consider the proof:

$$\begin{aligned} \text{Prove } (a+b) + -a &= b \\ (a+b) + -a &= (b+a) + -a \\ &= b + (a + -a) \\ &= b + 0 \\ &= b \end{aligned}$$

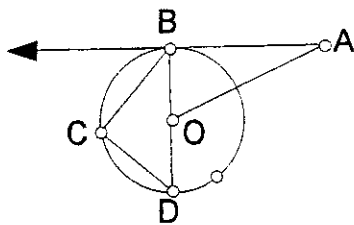
Which of the following axioms is not used as a reason in this proof?

- A. Commutative Axiom of Addition
  - B. Symmetric Axiom of Equality
  - C. Axiom of Additive Inverses
  - D. Additive Identity Axiom
  - E. NOTA
2. Circle M is circumscribed about  $\Delta ABC$  with sides of 3, 4, and 5. What is the area of circle M?
- A.  $25\pi/4$
  - B.  $6\pi$
  - C.  $9\pi/4$
  - D.  $17\pi/4$
  - E. NOTA
3. Solve:  $3y - 2(8y - 11) > 5 - (2y + 6)$
- A.  $y > 23/11$
  - B.  $y > -23/11$
  - C.  $y < -23/11$
  - D.  $y < 23/11$
  - E. NOTA
4. Find the total surface area of a right circular cone with radius of 5 and height of 12.
- A.  $65\pi$
  - B.  $85\pi$
  - C.  $100\pi$
  - D.  $70\pi$
  - E. NOTA
5. If  $a$ ,  $b$ , and  $c$  are three consecutive odd integers, and  $a > b > c$ , then what is the value of:
- $$(ab)(ac)(c-b)$$
- A. -16
  - B. -3
  - C. 0
  - D. 3
  - E. NOTA
6. A triangle and a trapezoid are equal in area. They also have the same altitude. If the base of the triangle is 18, the median of the trapezoid is:
- A. 46
  - B. 9
  - C. not enough information
  - D. 18
  - E. NOTA

7. Which of the following points is on the line containing  $(-2, 0)$  and  $(1, 3)$ ?
- A.  $(0, -2)$       B.  $(0, -3/2)$       C.  $(0, 1)$       D.  $(0, 2)$       E. NOTA
8. A rectangular solid has a diagonal of 15. If the length and width are 5 and 14, what is the height of the solid?
- A.  $\sqrt{2}$       B.  $\sqrt{3}$       C. 2      D. 3      E. NOTA
9. If  $f(x) = (2x + 3)^2$  and  $g(x) = \sqrt{x} - 5$ , for what values of  $x$  does  $g[f(x)] = 8$  ?
- A. 5, -5      B. 5, -8      C. only 5      D. 23      E. NOTA
10. Find the equation of the perpendicular bisector of a segment that connects the points  $(-2, 8)$  and  $(13, 3)$ .
- A.  $3x - y = 11$       B.  $x + 3y = 11$       C.  $-x + 3y = 11$   
D.  $-3x + y = 11$       E. NOTA
11. Jill does  $2/3$  of a job in 4 hours. Kelly can do  $3/4$  of what remains to be done in 1 hour. Greg can do what then remains to be done in 20 minutes. How long would it take to do the job if the three of them worked together?
- A. 4 hr.      B.  $2 \frac{1}{4}$  hr.      C.  $5/3$  hr      D.  $3/2$  hr.      E. NOTA
12. Find the area of a quadrilateral inscribed in a circle whose sides measure 10, 13, 19 and 16.
- A.  $8\sqrt{589}$       B.  $8\sqrt{872}$       C.  $4\sqrt{2470}$       D.  $3\sqrt{2210}$       E. NOTA
13. A line has a slope of  $-4$ . One of the points on the line is  $(-1, x-2)$ , and another point on the line is  $(-2, 2x+1)$ . Solve for  $x$ .
- A. -15      B. -7      C. 1      D. 5      E. NOTA



14. If AB is tangent to circle O at B, AB = 16, BC = 36 and AO = 34, then find CD.

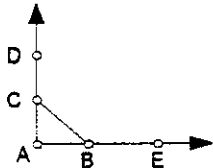


- A. 30      B. 4      C. 48      D. 36      E. NOTA

15. The numerator of a fraction is a 2 digit number. The denominator is that number with the digits reversed. The value of the fraction is  $\frac{17}{5}$ . What is the sum of the digits of the numerator?

- A. 5      B. 6      C. 8      D. 9      E. NOTA

16. In the figure shown,  $AC \perp AE$  and the bisectors of  $\angle DCB$  and  $\angle EBC$  intersect at P. Then find  $m\angle P$ .

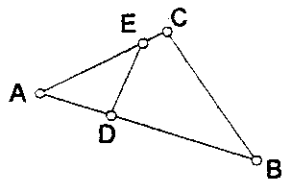


- A.  $30^\circ$       B.  $45^\circ$       C.  $60^\circ$       D.  $90^\circ$       E. NOTA

17. Solve: 
$$\frac{-n}{n+1} + \frac{n+1}{4-n} = \frac{-5}{n^2-3n-4}$$

- A. {4, -1}      B. {2, -1}      C. {2}      D. {-2}      E. NOTA

18. In the figure shown, if  $\angle AED \cong \angle ABC$ ,  $AE = 6$ ,  $EC = 4$ , and DB is 7 units longer than AD, then find AD.



- A. 3      B. 4      C. 5      D. 7      E. NOTA

19. Solve for  $x$ :  $2^{x+3} \cdot 2^x = 2$

- A.  $\{0, -3\}$     B.  $\{-1\}$     C.  $\{-2\}$     D.  $\{5\}$     E. NOTA

20. Given right triangle ABC with  $\angle B$  as the right angle, altitude BD,  $AB = 60$ , and  $BC = 25$ , find BD.

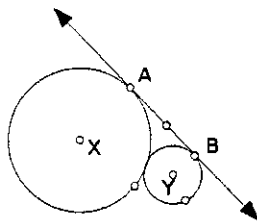
- A.  $23\frac{1}{13}$     B.  $30\sqrt{3}$     C. 30    D.  $55\frac{5}{13}$     E. NOTA

21. Find the number of integer solutions for :

$$\left| \frac{10-x}{3} \right| + 5 < 9$$

- A. 25    B. 23    C. 22    D. infinite    E. NOTA

22. Circles X and Y with radii 6 and 2 respectively are tangent to each other.  $\overleftrightarrow{AB}$  is a common tangent. What is the area of the shaded region?

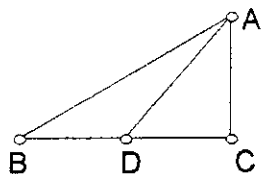


- A.  $16\sqrt{3} - \frac{22}{3}$     B.  $\frac{22}{3}\pi$     C.  $16\sqrt{3} - \frac{22\pi}{3}$     D.  $6\pi$     E. NOTA

23. If  $\frac{3x}{4y} = 5$ , find the value of  $\frac{3x-4y}{4y}$

- A.  $20y$     B.  $5 - 4y$     C. 4    D. 1    E. NOTA

24. Given  $\triangle ABC$ ,  $\overline{AC} \perp \overline{BC}$ ,  $AB = 12$ ,  $BD = 4\sqrt{3}$ , and  $AC = 6$ , find  $AD + DC$ .



- A.  $4\sqrt{3}$       B.  $2\sqrt{3}$       C.  $6\sqrt{3}$       D. 4      E. NOTA
25. Simplify:  $\frac{9y^2 + 46y + 5}{3y^2 - 2y - 1} \cdot \frac{y^3 + 5y^2 - 6y}{y^2 + 11y + 30}$
- A.  $\frac{9y^2 + y}{3y + 1}$       B.  $\frac{9y + 1}{3y + 1}$       C. 3      D. -1      E. NOTA
26. A water glass is shaped as a right circular cylinder with a radius of 2 inches. How much does the water level drop when 2 cubic inches of water is removed?
- A. 1 inch      B. 1.5 inches      C. .5 inch      D. 2 inches      E. NOTA
27. What is the coefficient of the linear term of the quotient of:
- $$x + 6 \overline{) 3x^4 + 14x^3 - 22x^2 + 14x + 18}$$
- A. -46      B. -4      C. 2      D. 170      E. NOTA
28. A right circular cone is filled with ice cream and surmounted by a half-sphere of ice cream. The exposed surface area of the ice cream is  $128\pi$ . The exposed surface area of the cone is  $136\pi$ . What is the volume of the ice cream?
- A.  $\frac{1984\pi}{3}$       B.  $\frac{1216\pi}{3}$       C.  $\frac{960\pi}{3}$       D.  $\frac{1024\pi}{3}$       E. NOTA
29. Simplify the expression  $\sqrt{720} - \sqrt{245} - \sqrt{1280}$  into the form  $a\sqrt{b}$ . What is the sum of  $a + b$ ?
- A. -14      B. 0      C. -4      D. 14      E. NOTA

30. All of the following statements are true EXCEPT

- A. If a line is parallel to each of two intersecting planes, then it is parallel to their intersection.
- B. If two lines are parallel, a plane containing one and only one of them is parallel to the other.
- C. Two lines perpendicular to the same line are parallel to each other.
- D. If two parallel planes are cut by a third plane, then the lines of intersection are parallel.
- E. Two planes perpendicular to the same line at different points of the line are parallel.