

Note: Figure not drawn to scale.

18. In the figure above,  $AB = BC$  and  $DE = EF = DF$ . If the measure of  $\angle ABC$  is  $30^\circ$  and the measure of  $\angle BDE$  is  $50^\circ$ , what is the measure of  $\angle DFA$ ?
- (A)  $30^\circ$
  - (B)  $35^\circ$
  - (C)  $40^\circ$
  - (D)  $45^\circ$
  - (E)  $50^\circ$

19. If  $a$ ,  $b$ ,  $c$ , and  $f$  are four nonzero numbers, then all of the following proportions are equivalent EXCEPT

(A)  $\frac{a}{f} = \frac{b}{c}$

(B)  $\frac{f}{c} = \frac{b}{a}$

(C)  $\frac{c}{a} = \frac{f}{b}$

(D)  $\frac{a}{c} = \frac{b}{f}$

(E)  $\frac{af}{bc} = \frac{1}{1}$

20. For all numbers  $x$  and  $y$ , let the operation  $\square$  be defined by  $x \square y = xy - y$ . If  $a$  and  $b$  are positive integers, which of the following can be equal to zero?

I.  $a \square b$

II.  $(a + b) \square b$

III.  $a \square (a + b)$

(A) I only

(B) II only

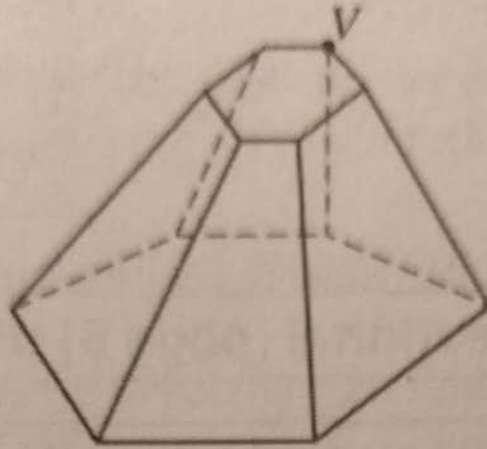
(C) III only

(D) I and II

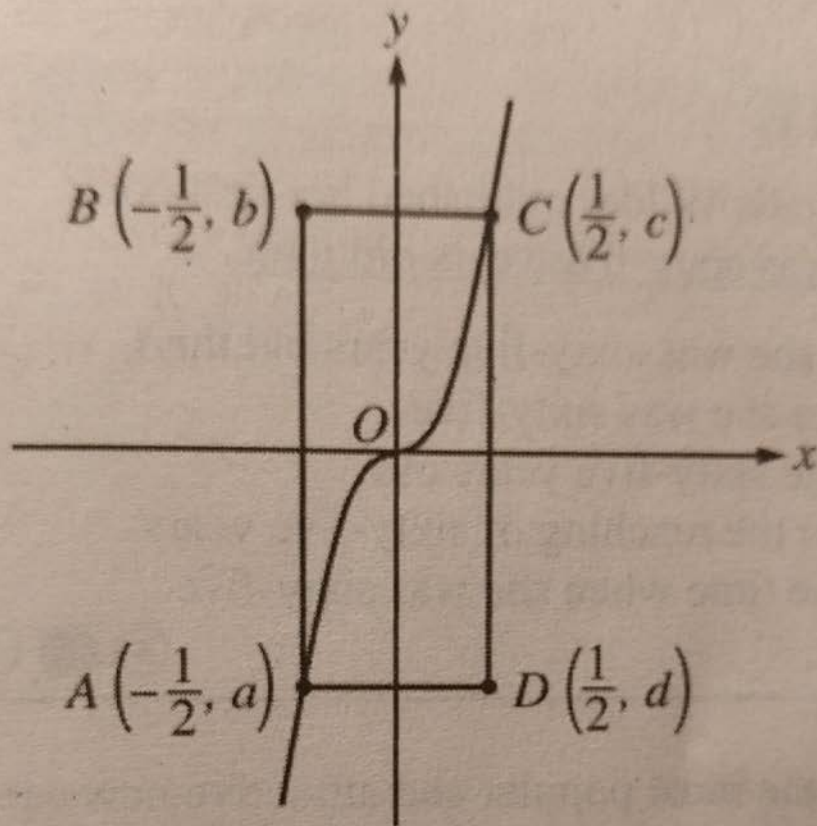
(E) I and III

8. If  $a$  and  $b$  are positive integers and  $\left(a^{\frac{1}{2}} b^{\frac{1}{3}}\right)^6 = 432$  what is the value of  $ab$ ?

- (A) 6
- (B) 12
- (C) 18
- (D) 24
- (E) 36



17. The three-dimensional figure above has two parallel bases and 18 edges. Line segments are to be drawn connecting vertex  $V$  with each of the other 11 vertices in the figure. How many of these segments will not lie on an edge of the figure?

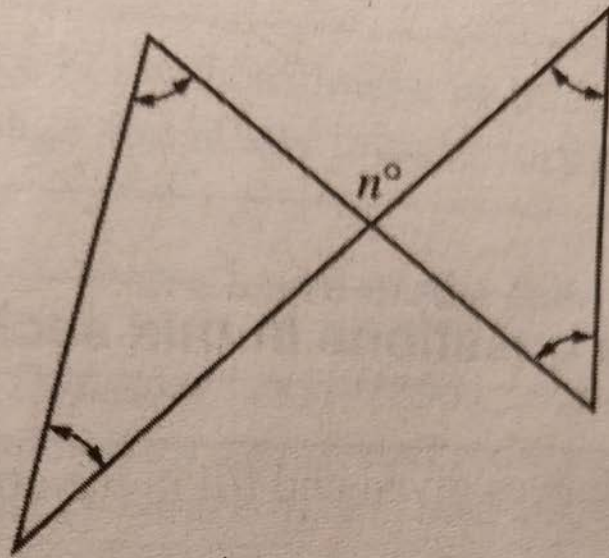


Note: Figure not drawn to scale.

18. In the figure above,  $ABCD$  is a rectangle. Points  $A$  and  $C$  lie on the graph of  $y = px^3$ , where  $p$  is a constant. If the area of  $ABCD$  is 4, what is the value of  $p$ ?

14. If  $0 \leq x \leq 8$  and  $-1 \leq y \leq 3$ , which of the following gives the set of all possible values of  $xy$ ?

- (A)  $xy = 4$
- (B)  $0 \leq xy \leq 24$
- (C)  $-1 \leq xy \leq 11$
- (D)  $-1 \leq xy \leq 24$
- (E)  $-8 \leq xy \leq 24$



15. In the figure above, what is the sum, in terms of  $n$ , of the degree measures of the four angles marked with arrows?

- (A)  $n$
- (B)  $2n$
- (C)  $180 - n$
- (D)  $360 - n$
- (E)  $360 - 2n$



16. After the first term, each term in a sequence is 3 greater than  $\frac{1}{3}$  of the preceding term. If  $t$  is the first term of the sequence and  $t \neq 0$ , what is the ratio of the second term to the first term?

(A)  $\frac{t + 9}{3}$

(B)  $\frac{t + 3}{3}$

(C)  $\frac{t + 9}{3t}$

(D)  $\frac{t + 3}{3t}$

(E)  $\frac{9 - 2t}{3}$

