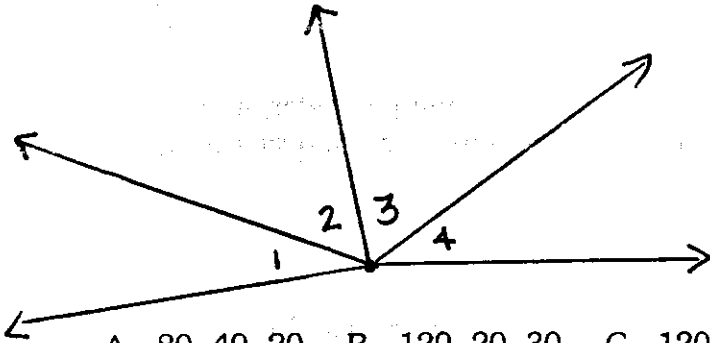


For all questions, answer E. "NOTA" means none of the above.  
 Figures not drawn to scale.

1. Point B is between A and C. Point D is between B and C. If  $BC = x$ ,  $AD = y$ , and  $BA = z$ , find the lengths of  $BD$  and  $DC$ , respectively.

A.  $y+z$ ;  $x-y+z$     B.  $y-z$ ;  $x-y-z$     C.  $y-z$ ;  $x+y+z$     D.  $y-z$ ;  $x-y+z$     E. NOTA

2. In the diagram below,  $m\angle 1 = 2(m\angle 2)$ ,  $m\angle 2 + m\angle 3 + m\angle 4 = 150$ ,  $m\angle 1 = m\angle 4$ , and  $m\angle 3 = 30$ . Find  $m\angle 1$ ,  $m\angle 2$ , and  $\frac{1}{4}m\angle 4$ , respectively.



A. 80, 40, 20    B. 120, 20, 30    C. 120, 40, 30    D. 80, 40, 80    E. NOTA

3. The measure of one of two adjacent angles is ten more than twice the measure of the other. If the sum of their measures is 88, find the difference of three times the larger angle and two less than the smaller angle.

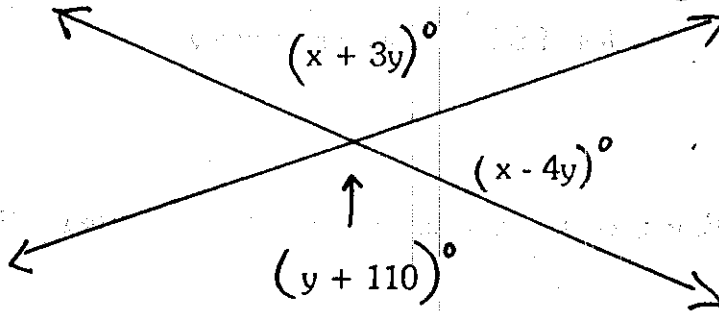
A. 26    B. 62    C. 162    D. 186    E. NOTA

4. The measure of a supplement of an angle is forty more than three times the measure of its complement. Find the absolute value of the difference between the supplement and complement of the original angle.

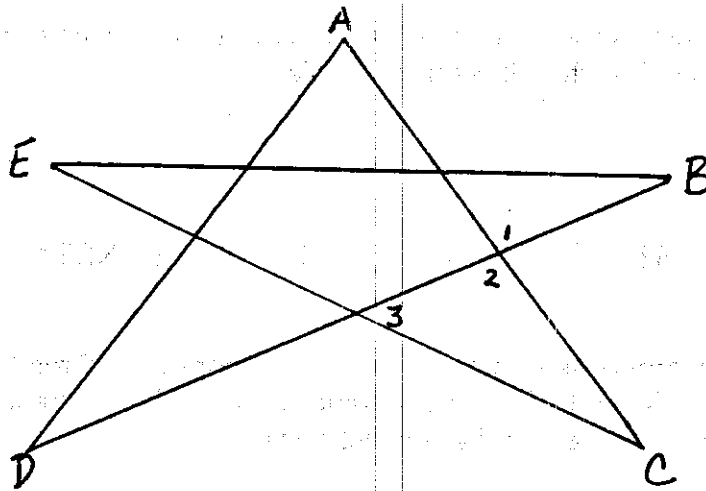
A. 25    B. 65    C. 115    D. 90    E. NOTA

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

5. Find the value of  $x$  and  $y$ , respectively, in the following diagram:



- A.  $x=110, y=70$  B.  $x=94, y=8$  C.  $x=8, y=94$  D.  $x=70, y=110$  E. NOTA
6. If a regular decagon and regular 13-gon have the same perimeter, and if the length of one side of the 13-gon is 5.4, what is the measure of twice a side of the decagon?
- A. 140.4 B. 70.2 C. 14.04 D. 7.02 E. NOTA
7. Find the sum of the measures of the five angles at the points of this star.



- A. 360 B. 180 C. 540 D. Insufficient information E. NOTA

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

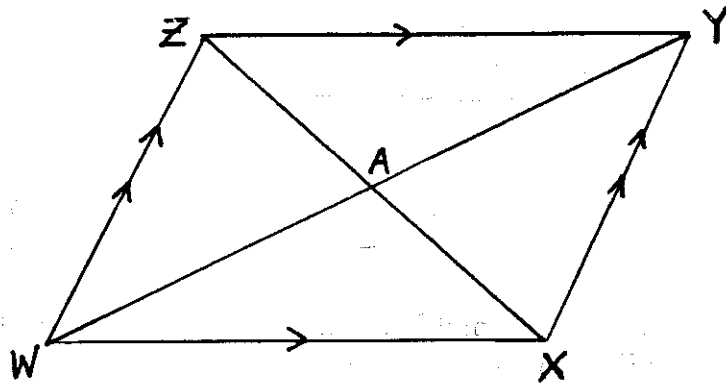
8. Given the statement, "If two angles are complementary, then both are acute", which of the following is the inverse of the converse of this statement.

- A. If two angles are not acute, then both are not complementary.
- B. If two angles are not complementary, then both are not acute.
- C. If two angles are acute, then both are complementary.
- D. If two angles are complementary, then both are not acute
- E. NOTA

9. If you take the contrapositive of the converse, which type of statement do you obtain?

- A. converse B. inverse C. contrapositive D. conditional E. NOTA

10. If  $m\angle ZWX = 4x + 7$  and  $m\angle WXY = 6x + 3$ , find  $2(m\angle YXW)$ .



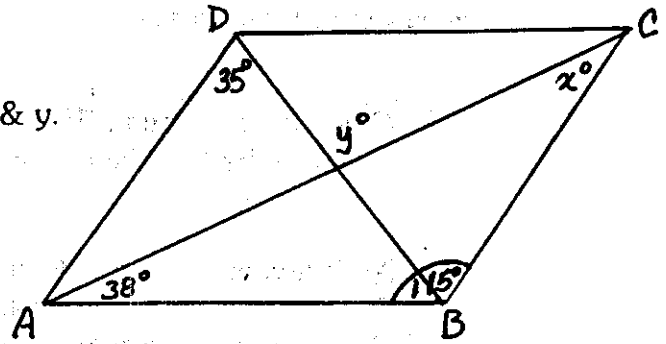
- A. 105 B. 75 C. 210 D. 150 E. NOTA

11. In a plane, if  $m\angle BAD = 65$  and  $m\angle DAC = 32$ , what is the  $m\angle CAB$ ?

- A. 33 B. 66 C. 97 D. 130 E. NOTA

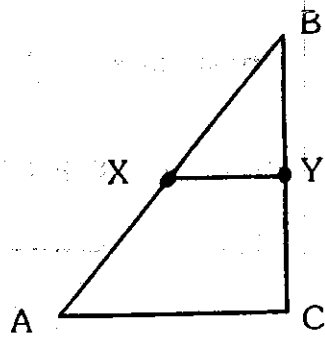
For all questions, answer E. "NOTA" means none of the above.  
 Figures not drawn to scale.

12. In parallelogram ABCD, find  $x$  &  $y$ .



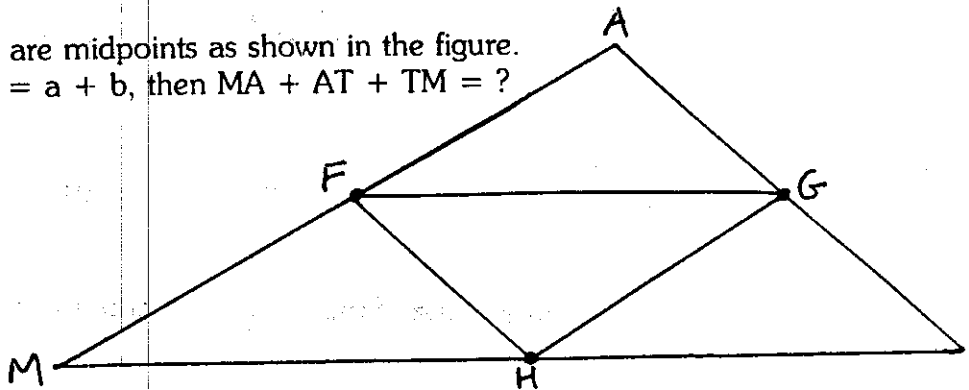
- A.  $x=35, y=77$     B.  $x=62, y=27$     C.  $x=77, y=35$   
 D.  $x=27, y=62$     E. NOTA

13. If X and Y are midpoints,  $AC = 4a + 5$ , and  $XY = a + 40$ , find XY.



- A. 37.5    B. 44.3    C. 77.5    D. 75    E. NOTA

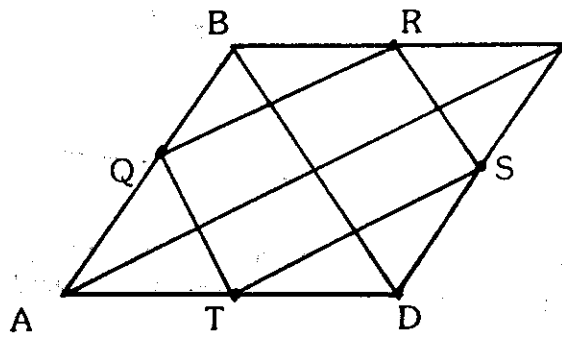
14. Points F, G, and H are midpoints as shown in the figure.  
 If  $FG + GH + HF = a + b$ , then  $MA + AT + TM = ?$



- A.  $2a + b$     B.  $2(a + b)$     C.  $4(a + b)$     D.  $\frac{1}{2}(a + b)$     E. NOTA

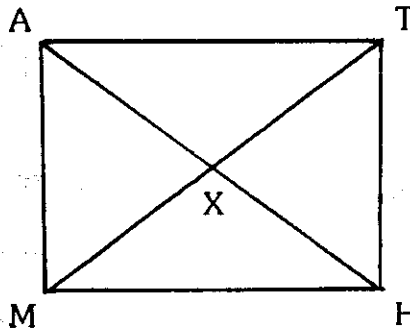
For all questions, answer E. "NOTA" means none of the above.  
 Figures not drawn to scale.

15. ABCD is a parallelogram. Points Q, R, S, and T are the midpoints of AB, BC, CD, and DA, respectively. If  $ST = 8$  and  $BD = 14$ , the  $AC + QT = ?$



- A. 6      B. 24      C. 22      D. 23      E. NOTA

16. Given rectangle MATH. If  $AX = 7x + 11$  and  $TX = 3x + 83$ , find AH.



- A. 8.6      B. 18      C. 155      D. 137      E. NOTA

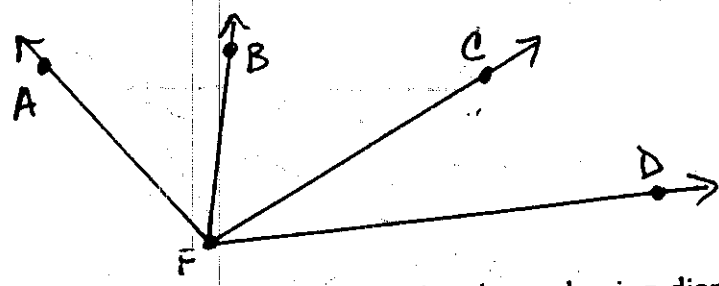
17. **You will improve if you work hard.**  
 The contrapositive of the above statement is:

- A. If you work hard, then you will improve.  
 B. If you improve, then you worked hard.  
 C. If you do not improve, then you have not worked hard.  
 D. If you do not work hard, then you will not improve.  
 E. NOTA

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

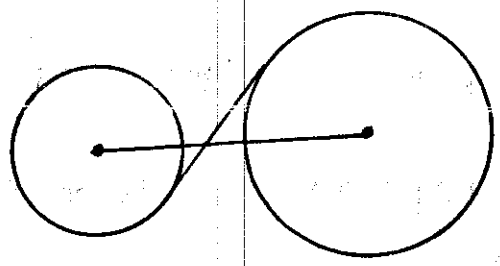
18. If  $m\angle AFC = 3 m\angle AFB$ ,  $\vec{FC}$  bisects  $\angle AFD$ , and  $m\angle AFB = 16$ , find  $m\angle AFD$ .

- A. 16
- B. 48
- C. 96
- D. 192
- E. NOTA

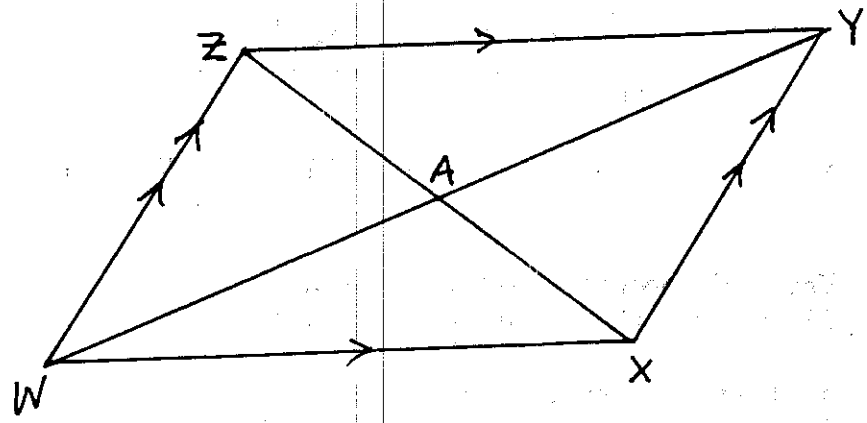


19. The distance between the centers of the two circles shown having diameter of 6 and 12 is 18. How long is the common internal tangent segment?

- A. 6
- B.  $9\sqrt{3}$
- C.  $6\sqrt{3}$
- D.  $3\sqrt{3}$
- E. NOTA



20. If  $ZY = 7a + 2b$ ,  $WX = b + 28$ ,  $ZW = 4a - b$  and  $YX = a + 12$ , find  $a + b$ .

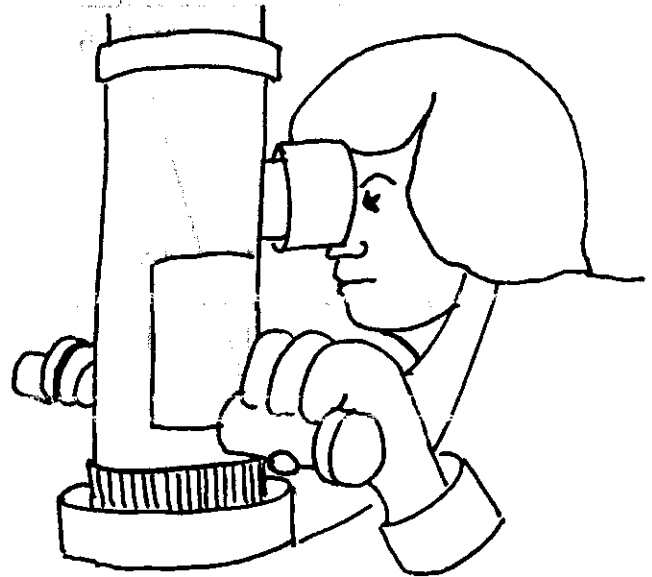
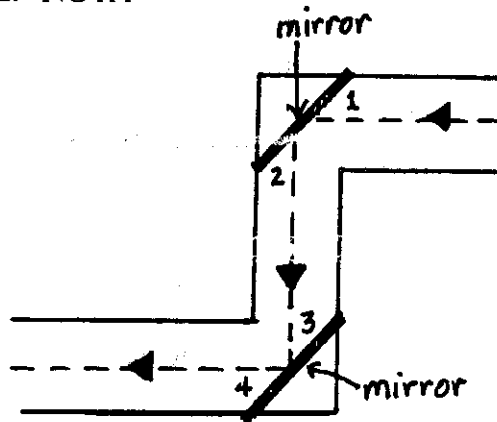


- A. 4
- B. 0
- C. 40
- D. 12
- E. NOTA

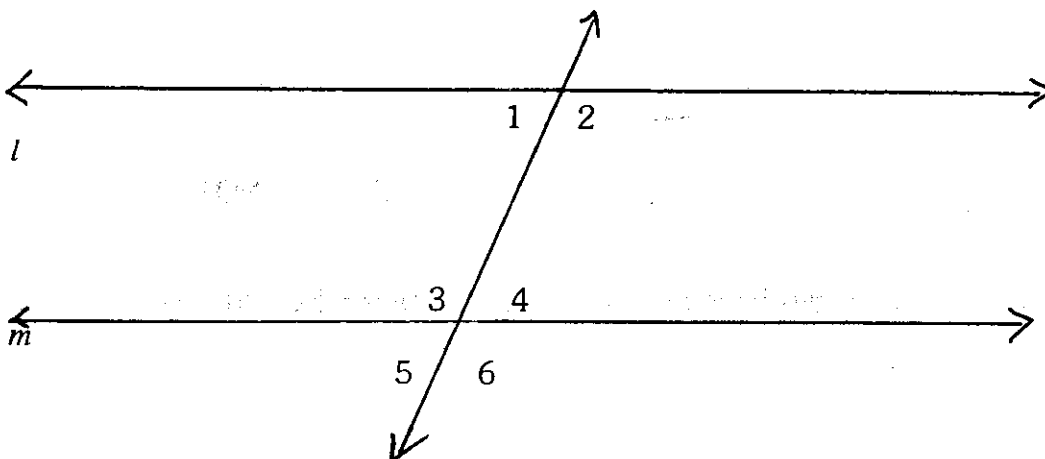
For all questions, answer E. "NOTA" means none of the above.  
 Figures not drawn to scale.

21. In a periscope a pair of mirrors are mounted parallel to each other as shown. The path of light becomes a transversal. Which pair of angles is an alternate interior pair?

- A.  $\angle 1$  and  $\angle 3$
- B.  $\angle 1$  and  $\angle 4$
- C.  $\angle 2$  and  $\angle 3$
- D.  $\angle 2$  and  $\angle 4$
- E. NOTA



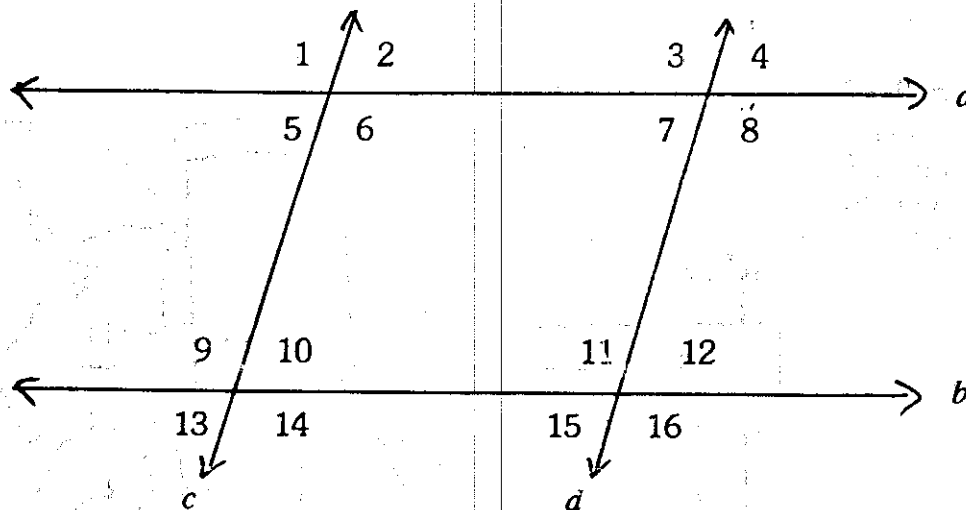
22. If  $m\angle 1 = 2x + 4$ ,  $m\angle 5 = 3y + 6$ , and  $m\angle 2 = 4y + 6$ , find the product of  $(m\angle 1, m\angle 2, \text{ and } m\angle 5) \div 2808$ .



- A. 24
- B. 78
- C. 102
- D. 221
- E. NOTA

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

23. Given  $a \parallel b$ ,  $c \parallel d$ ,  $m\angle 1 = 8x - 2$ ,  $m\angle 11 = 7x + 11$ , find the sum of the digits in both  $x$  and  $m\angle 10$ .



- A. 19      B. 115      C. 91      D. 102      E. NOTA
24. A rectangle has a length three times its width. Find the area of a new rectangle if the original perimeter was 24 and the length is shortened by 2.
- A. 3      B. 9      C. 21      D. 27      E. NOTA
25. A linear pair of angles have measures of  $2x + 20$  and  $3x - 30$ . Find the difference of the measure of the larger angle minus the smaller angle.
- A. 12      B. 38      C. 84      D. 96      E. NOTA

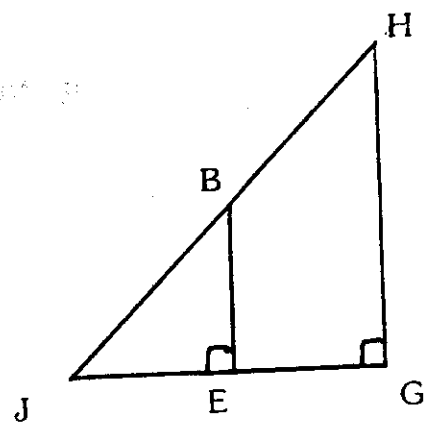


For all questions, answer E. "NOTA" means none of the above.  
Figures not drawn to scale.

26. In triangle ABC, angle A is congruent to angle C. If  $AB = 4x + 25$ ,  $BC = 2x + 45$ , and  $AC = 3x - 15$ , find the length of the shortest side.

- A. 10      B. 15      C. 35      D. 65      E. NOTA

27.  $\triangle HGJ$  is a right triangle.  $HG \parallel BE$ ,  $HG = 9$ ,  $BE = 4$  and  $GJ = 13$ . Find  $EJ$ .



- A. 5      B.  $52/9$       C.  $68/9$       D. 8      E. NOTA

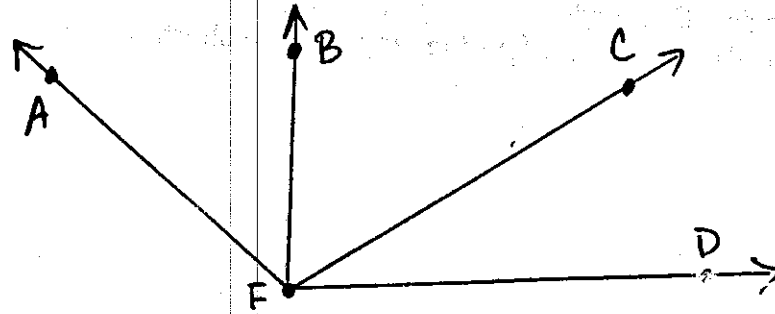
28. Find the measure of each interior angle of a regular 15-gon.

- A. 156 degrees      B. 78 degrees      C. 24 degrees      D. 180 degrees      E. NOTA

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

29. If  $m\angle BFC = 3 m\angle AFB$ ,  $m\angle CFD = 4 m\angle AFB$ , and  $m\angle AFD = (m\angle AFB)^2 - 240$ , find  $m\angle AFB$ .

- A. 20
- B. -12
- C. 20, -12
- D. 8
- E. NOTA



30. The measure of an angle is twenty-four more than the measure of its supplement. Find the measure of the angle.

- A. 102
- B. 78
- C. 57
- D. 33
- E. NOTA