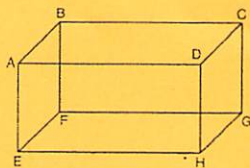


The diagram below shows a rectangular prism.



Which pair of edges are segments of lines that are coplanar?

- (1) AB and DH (3) BC and EH
(2) AE and DC (4) CG and EF

2. Which of the four centers *always* remains on or inside a triangle?

- (1) incenter, only
(2) incenter and centroid
(3) orthocenter and incenter
(4) circumcenter, only

3. Given points $A(0, 0)$, $B(3, 2)$, and $C(-2, 3)$, which statement is true?

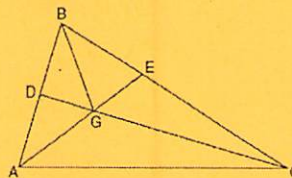
- (1) \overline{AB} is parallel to \overline{AC} .
(2) \overline{AB} is perpendicular to \overline{AC} .
(3) AB is greater than BC .
(4) \overline{BC} is perpendicular to \overline{CA} .

4. Given: $y = \frac{1}{4}x - 3$
 $y = x^2 + 8x + 12$.

In which quadrant will the graphs of the given equations intersect?

- (1) I (2) II (3) III (4) IV

5. In the diagram below of $\triangle ABC$, CD is the bisector of $\angle BCA$, AE is the bisector of $\angle CAB$, and BG is drawn.



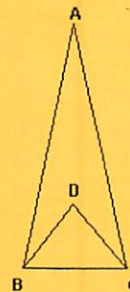
Which statement must be true?

- (1) $DG = EG$ (3) $\angle AEB \cong \angle AEC$
(2) $AG = BG$ (4) $\angle DBG \cong \angle EBG$

6. Which statement is the inverse of the statement "If Abbey is not injured, she will win the race"?

- (1) If Abbey wins the race, she is not injured.
(2) If Abbey is injured, she will win the race.
(3) If Abbey is injured, she will not win the race.
(4) If Abbey does not win the race, she is injured.

7. In the diagram of $\triangle ABC$, $\overline{AB} \cong \overline{AC}$, \overline{DB} and \overline{DC} are angle bisectors, and $m\angle BAC = 20$. Find $m\angle BDC$.



- (1) 40 (2) 80 (3) 100 (4) 120

Short Answer

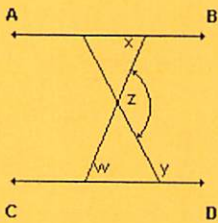
Please show all work on a separate piece of paper and/or graph paper.

8. In $\triangle ABC$, $m\angle B > m\angle C$ and $m\angle C > m\angle A$. Which side of $\triangle ABC$ is longest?

9. What is the distance between the points $R(5, 7)$ and $S(-2, 3)$?

10. What is the slope of the line containing points $A(4, -1)$ and $B(0, 2)$?

11. In the diagram: $\overleftrightarrow{AB} \parallel \overleftrightarrow{CD}$, $m\angle x = 68$, and $m\angle y = 117$. What is $m\angle z$?

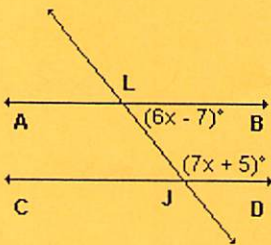


12. If the coordinates of P are $(-2, 7)$, what are the coordinates of $(D_2 \circ r_{y=x})(P)$?

13. Plane P passes through point M on line L . If plane P is perpendicular to line L at point M , then how many other planes can also be perpendicular to line L at point M ?

14. Given $\triangle ABC$ with medians \overline{AD} , \overline{BE} , and \overline{CF} intersect at G . If $CF = 24$, what is the length of \overline{FG} ?

15. In the diagram: $\overleftrightarrow{ALB} \parallel \overleftrightarrow{CJD}$ and \overleftrightarrow{LJ} is a transversal. If $m\angle JLB = 6x - 7$ and $m\angle LJD = 7x + 5$, what is the value of x ?



16. In right $\triangle DEF$, $m\angle D = 90$ and $m\angle F$ is 12 degrees less than twice $m\angle E$. Find $m\angle E$.

17. The equation of line k is $y = \frac{1}{3}x - 2$. The equation of line m is $-2x + 6y = 18$. Are lines k and m parallel, perpendicular or neither?

8. \overline{AC}

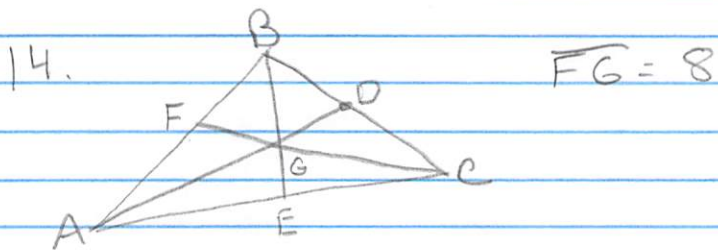
$$9. d = \sqrt{(5+2)^2 + (7-3)^2}$$
$$= \sqrt{7^2 + 4^2}$$
$$= \sqrt{65}$$

$$10. m = \frac{2+1}{0-4} = \boxed{-\frac{3}{4}}$$

$$11. m\angle X = 68^\circ$$
$$m\angle W = 68^\circ$$
$$m\angle Y = 117^\circ$$
$$\boxed{m\angle Z = 131^\circ}$$

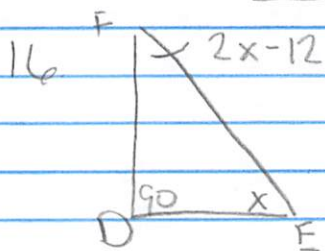
$$12. P(-2, 7) \rightarrow P'(7, -2) \rightarrow P''(14, -4)$$

13. 0



$$15. 6x - 7 + 7x + 5 = 180$$
$$13x - 2 = 180$$
$$13x = 182$$
$$\boxed{x = 14}$$

$$\textcircled{17} y = \frac{1}{3}x - 2$$
$$y = \frac{1}{3}x + 3$$
$$\boxed{\text{Parallel}}$$



$$90 + 2x - 12 + x = 180$$
$$3x + 78 = 180$$
$$3x = 102$$
$$x = 34$$
$$\boxed{m\angle F = 34^\circ}$$