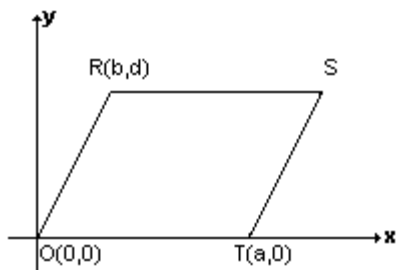


1. Which statement is the contrapositive of the statement "If a triangle is a right triangle, then it has two complementary angles"?

- (1) If a triangle is a right triangle, then it does not have two complementary angles.
- (2) If a triangle does not have two complementary angles, then it is not a right triangle.
- (3) If a triangle is not a right triangle, then it has two complementary angles.
- (4) If a triangle does not have two complementary angles, then it is a right triangle.

2. In the diagram, three vertices of parallelogram  $ORST$  are  $O(0, 0)$ ,  $R(b, d)$ , and  $T(a, 0)$ . What are the coordinates of  $S$ ?



- (1)  $(a, b)$
- (2)  $(a, d)$
- (3)  $(a + b, d)$
- (4)  $(a + b, b)$

3. In quadrilateral  $ABCD$ ,  $\overline{AB} \cong \overline{DC}$  and  $\overline{AB} \parallel \overline{DC}$ . Which statement *must* be true?

- (1)  $\overline{BD} \cong \overline{AC}$
- (2)  $\overline{AB} \cong \overline{BC}$
- (3)  $\overline{AC} \cong \overline{AD}$
- (4)  $\overline{AD} \cong \overline{BC}$

4. The intersection of a plane and a line not in the plane can be a

- (1) line
- (2) point
- (3) right angle
- (4) none of the above

5. A translation maps  $A(1, 2)$  onto  $A'(-1, 3)$ . What are the coordinates of the image of the origin under the same translation?

- (1)  $(0, 0)$
- (2)  $(2, -1)$
- (3)  $(-2, 1)$
- (4)  $(-1, 2)$

6. If two sides of a triangle have lengths 4 and 9, then the length of the third side may be any number

- (1) greater than 4 but less than 9
- (2) greater than 5
- (3) less than 13
- (4) greater than 5 but less than 13

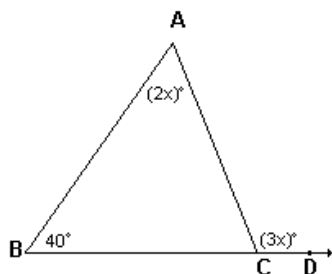
7. If the angles of a triangle are represented by  $x$ ,  $3x + 20$ , and  $6x$ , the triangle must be

- (1) obtuse
- (2) right
- (3) acute
- (4) isosceles

## Short Answer

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

8. In the diagram,  $\angle ACD$  is an exterior angle of  $\triangle ABC$ . If  $m\angle B = 40$ ,  $m\angle A = 2x$ , and  $m\angle ACD = 3x$ , what is the value of  $x$ ?



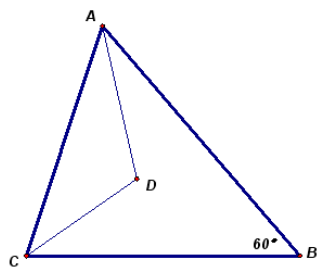
9. Triangle  $ABC$  has vertices  $A(5, 7)$ ,  $B(11, -1)$ , and  $C(3, 3)$ . Write the equation of the altitude to side  $\overline{AC}$  in slope-intercept form?

10. What is the distance between points  $(6, -9)$  and  $(-3, 4)$  in simplest radical form?

11. What is the measure of the *largest* angle of a triangle whose angles measures are in the ratio of 2:3:4?

12. If the length of the line segment joining the midpoints of two sides of an equilateral triangle is 6, find the perimeter of the triangle.

13. Given that point  $D$  is the incenter of triangle  $ABC$ , what is the measure of angle  $ADC$ ?



14. **Given:**  $\overline{AEC}$  bisects  $\angle DAB$  and  $\angle 1 \cong \angle 2$

**Prove:**  $\overline{BC} \cong \overline{DC}$

