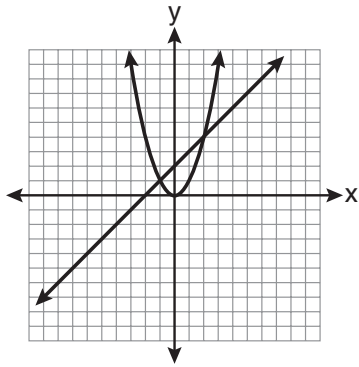


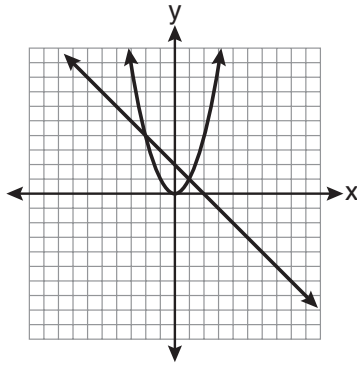
Use this space for computations.

5 Which graph could be used to find the solution to the following system of equations?

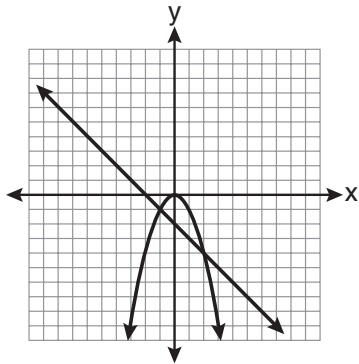
$$y = -x + 2$$
$$y = x^2$$



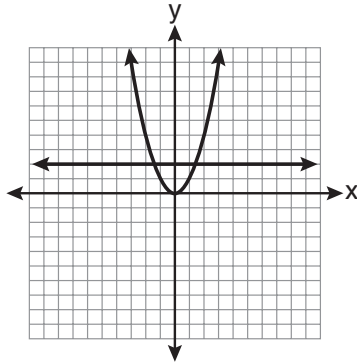
(1)



(3)



(2)



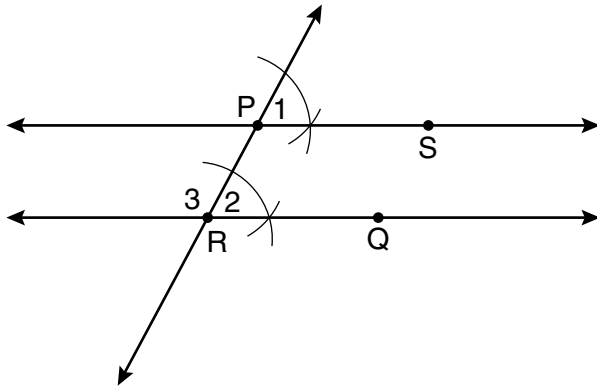
(4)

6 Line k is drawn so that it is perpendicular to two distinct planes, P and R . What must be true about planes P and R ?

- (1) Planes P and R are skew.
- (2) Planes P and R are parallel.
- (3) Planes P and R are perpendicular.
- (4) Plane P intersects plane R but is not perpendicular to plane R .

Use this space for computations.

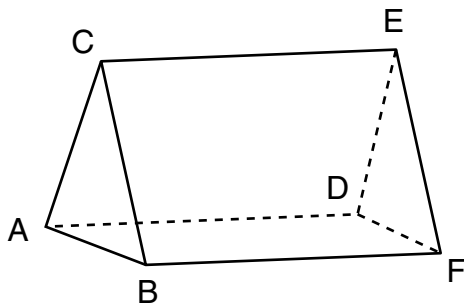
7 The diagram below illustrates the construction of \overleftrightarrow{PS} parallel to \overleftrightarrow{RQ} through point P .



Which statement justifies this construction?

- (1) $m\angle 1 = m\angle 2$
- (2) $m\angle 1 = m\angle 3$
- (3) $\overline{PR} \cong \overline{RQ}$
- (4) $\overline{PS} \cong \overline{RQ}$

8 The figure in the diagram below is a triangular prism.



Which statement must be true?

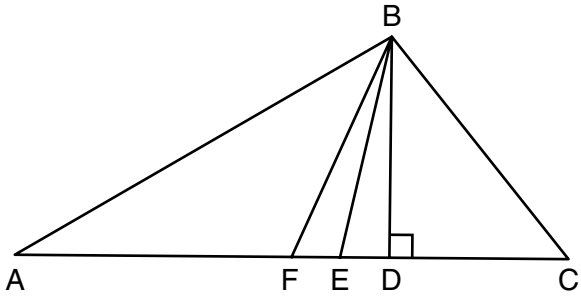
- (1) $\overline{DE} \cong \overline{AB}$
- (2) $\overline{AD} \cong \overline{BC}$
- (3) $\overline{AD} \parallel \overline{CE}$
- (4) $\overline{DE} \parallel \overline{BC}$

Use this space for computations.

9 The vertices of $\triangle ABC$ are $A(-1,-2)$, $B(-1,2)$, and $C(6,0)$. Which conclusion can be made about the angles of $\triangle ABC$?

- (1) $m\angle A = m\angle B$
- (2) $m\angle A = m\angle C$
- (3) $m\angle ACB = 90$
- (4) $m\angle ABC = 60$

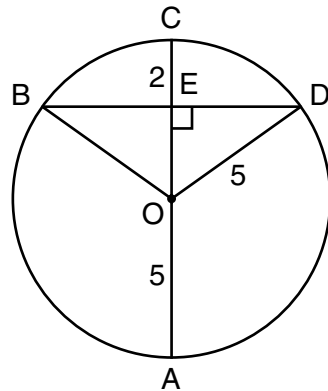
10 Given $\triangle ABC$ with base \overline{AFEDC} , median \overline{BF} , altitude \overline{BD} , and \overline{BE} bisects $\angle ABC$, which conclusion is valid?



- (1) $\angle FAB \cong \angle ABF$
- (2) $\angle ABF \cong \angle CBD$
- (3) $\overline{CE} \cong \overline{EA}$
- (4) $\overline{CF} \cong \overline{FA}$

Use this space for computations.

- 11 In the diagram below, circle O has a radius of 5, and $CE = 2$. Diameter \overline{AC} is perpendicular to chord \overline{BD} at E .



What is the length of \overline{BD} ?

- | | |
|--------|-------|
| (1) 12 | (3) 8 |
| (2) 10 | (4) 4 |
- 12 What is the equation of a line that passes through the point $(-3, -11)$ and is parallel to the line whose equation is $2x - y = 4$?
- | | |
|------------------|--|
| (1) $y = 2x + 5$ | (3) $y = \frac{1}{2}x + \frac{25}{2}$ |
| (2) $y = 2x - 5$ | (4) $y = -\frac{1}{2}x - \frac{25}{2}$ |

Use this space for
computations.

13 Line segment AB has endpoints $A(2,-3)$ and $B(-4,6)$. What are the coordinates of the midpoint of \overline{AB} ?

(1) $(-2,3)$

(3) $(-1,3)$

(2) $(-1,1\frac{1}{2})$

(4) $(3,4\frac{1}{2})$

14 What are the center and radius of a circle whose equation is $(x-A)^2 + (y-B)^2 = C$?

(1) center = (A,B) ; radius = C

(2) center = $(-A,-B)$; radius = C

(3) center = (A,B) ; radius = \sqrt{C}

(4) center = $(-A,-B)$; radius = \sqrt{C}

15 A rectangular prism has a volume of $3x^2 + 18x + 24$. Its base has a length of $x + 2$ and a width of 3. Which expression represents the height of the prism?

(1) $x + 4$

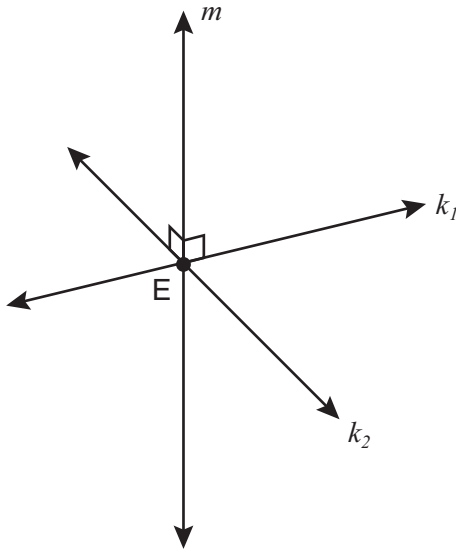
(3) 3

(2) $x + 2$

(4) $x^2 + 6x + 8$

Use this space for computations.

- 16 Lines k_1 and k_2 intersect at point E. Line m is perpendicular to lines k_1 and k_2 at point E.

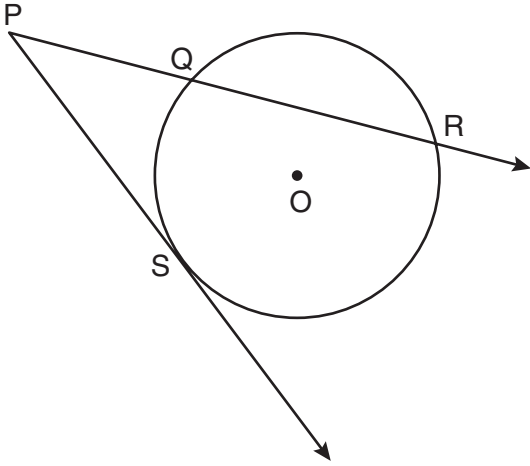


Which statement is always true?

- (1) Lines k_1 and k_2 are perpendicular.
- (2) Line m is parallel to the plane determined by lines k_1 and k_2 .
- (3) Line m is perpendicular to the plane determined by lines k_1 and k_2 .
- (4) Line m is coplanar with lines k_1 and k_2 .

Use this space for
computations.

- 17 In the diagram below, \overline{PS} is a tangent to circle O at point S , \overline{PQR} is a secant, $PS = x$, $PQ = 3$, and $PR = x + 18$.



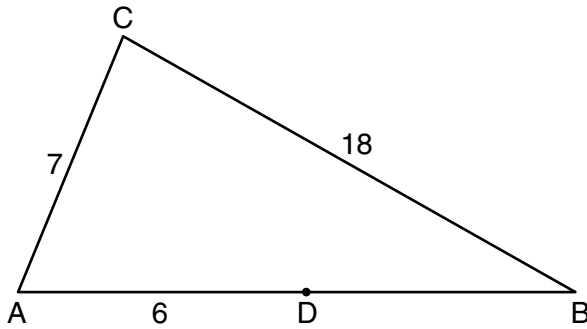
(Not drawn to scale)

What is the length of \overline{PS} ?

- (1) 6
(2) 9
(3) 3
(4) 27
- 18 A polygon is transformed according to the rule: $(x, y) \rightarrow (x + 2, y)$.
Every point of the polygon moves two units in which direction?
- (1) up
(2) down
(3) left
(4) right

Use this space for
computations.

- 19 In the diagram below of $\triangle ABC$, D is a point on \overline{AB} , $AC = 7$, $AD = 6$, and $BC = 18$.

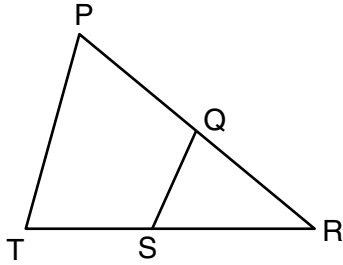


(Not drawn to scale)

The length of \overline{DB} could be

- (1) 5
(2) 12
(3) 19
(4) 25
- 20 The diameter of a circle has endpoints at $(-2,3)$ and $(6,3)$. What is an equation of the circle?
- (1) $(x - 2)^2 + (y - 3)^2 = 16$
(2) $(x - 2)^2 + (y - 3)^2 = 4$
(3) $(x + 2)^2 + (y + 3)^2 = 16$
(4) $(x + 2)^2 + (y + 3)^2 = 4$

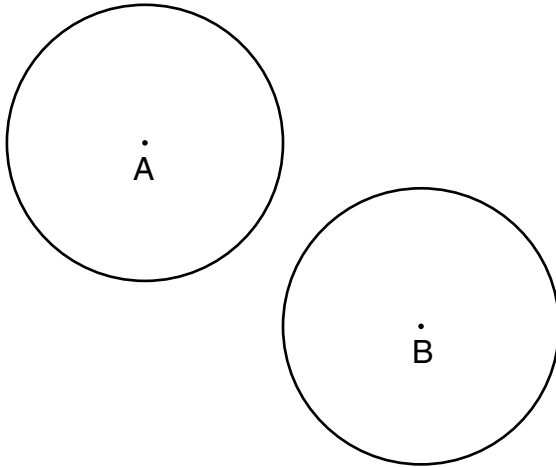
- 21 In the diagram below of $\triangle PRT$, Q is a point on \overline{PR} , S is a point on \overline{TR} , \overline{QS} is drawn, and $\angle RPT \cong \angle RSQ$.



Which reason justifies the conclusion that $\triangle PRT \sim \triangle SRQ$?

- (1) AA
(2) ASA
(3) SAS
(4) SSS
- 22 The lines $3y + 1 = 6x + 4$ and $2y + 1 = x - 9$ are
- (1) parallel
(2) perpendicular
(3) the same line
(4) neither parallel nor perpendicular
- 23 The endpoints of \overline{AB} are $A(3,2)$ and $B(7,1)$. If $\overline{A''B''}$ is the result of the transformation of \overline{AB} under $D_2 \circ T_{-4,3}$ what are the coordinates of A'' and B'' ?
- (1) $A''(-2,10)$ and $B''(6,8)$
(2) $A''(-1,5)$ and $B''(3,4)$
(3) $A''(2,7)$ and $B''(10,5)$
(4) $A''(14,-2)$ and $B''(22,-4)$

24 In the diagram below, circle A and circle B are shown.



What is the total number of lines of tangency that are common to circle A and circle B ?

- | | |
|-------|-------|
| (1) 1 | (3) 3 |
| (2) 2 | (4) 4 |
- 25 In which triangle do the three altitudes intersect outside the triangle?
- (1) a right triangle
 - (2) an acute triangle
 - (3) an obtuse triangle
 - (4) an equilateral triangle
- 26 Two triangles are similar, and the ratio of each pair of corresponding sides is $2 : 1$. Which statement regarding the two triangles is *not* true?
- (1) Their areas have a ratio of $4 : 1$.
 - (2) Their altitudes have a ratio of $2 : 1$.
 - (3) Their perimeters have a ratio of $2 : 1$.
 - (4) Their corresponding angles have a ratio of $2 : 1$.

**Use this space for
computations.**

27 What is the measure of an interior angle of a regular octagon?

(1) 45°

(3) 120°

(2) 60°

(4) 135°

28 What is the slope of a line perpendicular to the line whose equation is $5x + 3y = 8$?

(1) $\frac{5}{3}$

(3) $-\frac{3}{5}$

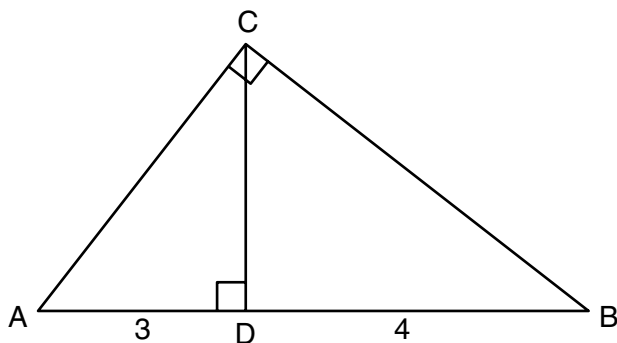
(2) $\frac{3}{5}$

(4) $-\frac{5}{3}$

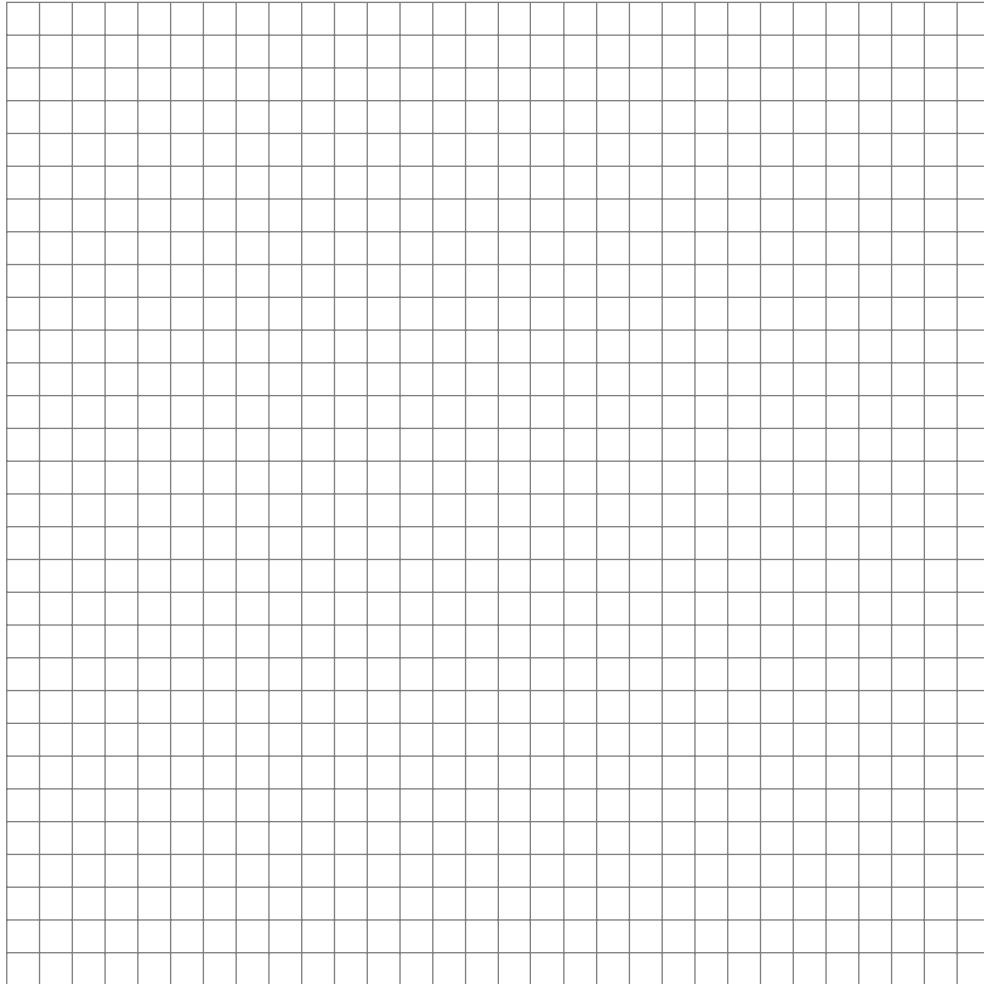
Part II

Answer all 6 questions in this part. Each correct answer will receive 2 credits. Clearly indicate the necessary steps, including appropriate formula substitutions, diagrams, graphs, charts, etc. For all questions in this part, a correct numerical answer with no work shown will receive only 1 credit. [12]

- 29 In the diagram below of right triangle ACB , altitude \overline{CD} intersects \overline{AB} at D . If $AD = 3$ and $DB = 4$, find the length of \overline{CD} in simplest radical form.

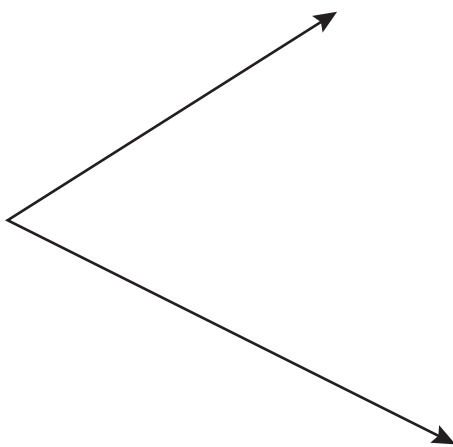


- 30 The vertices of $\triangle ABC$ are $A(3,2)$, $B(6,1)$, and $C(4,6)$. Identify and graph a transformation of $\triangle ABC$ such that its image, $\triangle A'B'C'$, results in $\overline{AB} \parallel \overline{A'B'}$.



31 The endpoints of \overline{PQ} are $P(-3,1)$ and $Q(4,25)$. Find the length of \overline{PQ} .

32 Using a compass and straightedge, construct the bisector of the angle shown below. [*Leave all construction marks.*]



33 The volume of a cylinder is $12,566.4 \text{ cm}^3$. The height of the cylinder is 8 cm. Find the radius of the cylinder to the *nearest tenth of a centimeter*.

34 Write a statement that is logically equivalent to the statement “If two sides of a triangle are congruent, the angles opposite those sides are congruent.”

Identify the new statement as the converse, inverse, or contrapositive of the original statement.

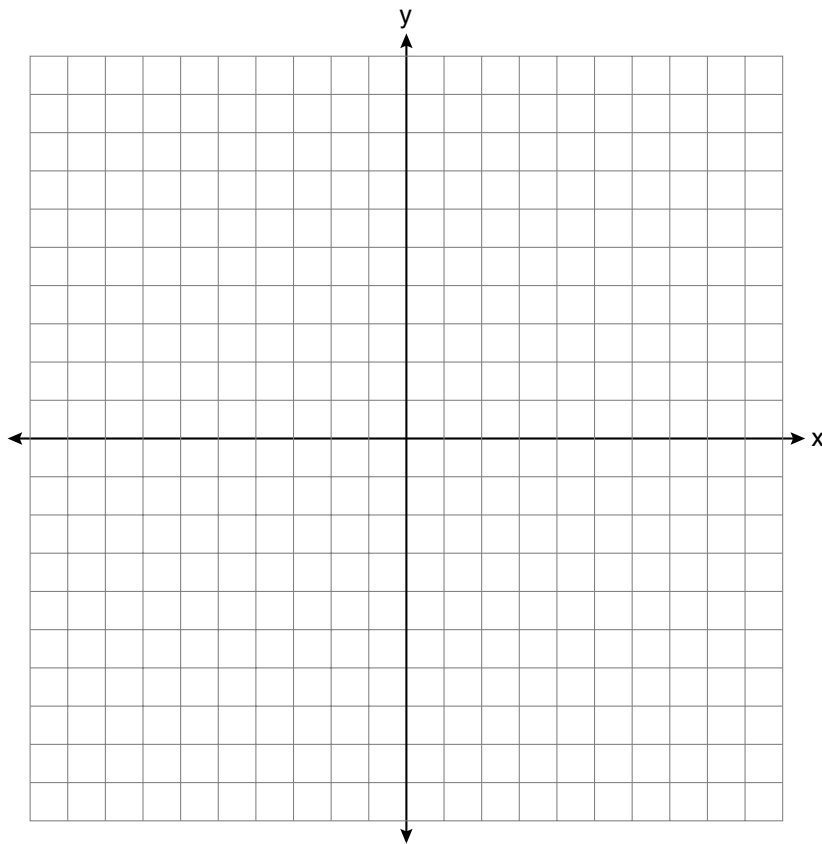
Part III

Answer all 3 questions in this part. Each correct answer will receive 4 credits. Clearly indicate the necessary steps, including appropriate formula substitutions, diagrams, graphs, charts, etc. For all questions in this part, a correct numerical answer with no work shown will receive only 1 credit. [12]

35 On the set of axes below, graph and label $\triangle DEF$ with vertices at $D(-4,-4)$, $E(-2,2)$, and $F(8,-2)$.

If G is the midpoint of \overline{EF} and H is the midpoint of \overline{DE} , state the coordinates of G and H and label each point on your graph.

Explain why $\overline{GH} \parallel \overline{DE}$.



- 36 In the diagram below of circle O , chords \overline{DF} , \overline{DE} , \overline{FG} , and \overline{EG} are drawn such that $m\widehat{DF} : m\widehat{FE} : m\widehat{EG} : m\widehat{GD} = 5 : 2 : 1 : 7$. Identify one pair of inscribed angles that are congruent to each other and give their measure.

