Geometry
Final Exam Solutions

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MATH

Geometry Final Exam Answer Key

1. (5 pts)	A	B	C	D	■
2. (5 pts)	■	B	C	D	E
3. (5 pts)	A	■	C	D	E
4. (5 pts)	A	B	C	■	E
5. (5 pts)	■	B	C	D	E
6. (5 pts)	■	B	C	D	E
7. (5 pts)	A	B	■	D	E
8. (5 pts)	A	■	C	D	E

9. (15 pts) $a = 4$ and $b = 4\sqrt{3}$

10. (15 pts) 18π cm^3

11. (15 pts) $5\sqrt{2}$

12. (15 pts) $A'(-1,3)$, $B'(4,0)$, $C'(-2,-8)$

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1. E. Find the slope of line AB using the slope formula.

$$m = \frac{y_2 - y_1}{x_2 - x_1} = \frac{7-3}{7-1} = \frac{4}{6} = \frac{2}{3}$$

The slope of the line parallel to AB is the negative reciprocal of $2/3$.

$$-\frac{3}{2}$$

2. A. Vertical angles are congruent and the angle vertical to $(3x + 25)$ is the same-side angle to $(5x - 9)$. Same-side angles are supplementary, so

$$3x + 25 + 5x - 9 = 180$$

$$8x + 16 = 180$$

$$8x = 164$$

$$x = 20.5$$

3. B. We'll use the formula for the interior angles of a regular polygon.

$$\frac{(n-2)180}{n}$$

A nonagon has 9 sides which means that $n = 9$.

$$\frac{(n-2)180}{n} = \frac{(9-2)180}{9} = \frac{(7)180}{9} = \frac{1{,}260}{9} = 140^\circ$$

4. D. The diagonals of a parallelogram bisect each other, so VT is

$$VT = \frac{1}{2}RT$$

$$VT = \frac{1}{2}(12)$$

$$VT = 6$$

and VS is

$$VS = \frac{1}{2}US$$

$$VS = \frac{1}{2}(5)$$

$$VS = 2.5$$

Opposite sides of a parallelogram are congruent, so

$$RU = ST$$

$$3.5 = 3.5$$

Therefore, the perimeter of $\Delta STV = VT + VS + ST$ is

$$6 + 2.5 + 3.5 = 12$$

5. A. The equation of a circle is $(x-h)^2+(y-k)^2=r^2$. The center of this circle is $(2,1)$ and the radius is $r=3$, which means $h=2$, $k=1$, and $r=3$.

$$(x-h)^2+(y-k)^2=r^2$$

$$(x-2)^2+(y-1)^2=3^2$$

$$(x-2)^2+(y-1)^2=9$$

6. A. Two intersecting secants follow the pattern

outside · whole = outside · whole

Plug in the values from the figure.

$$x(x+9)=7(7+3)$$

$$x^2+9x=7(10)$$

$$x^2+9x=70$$

$$x^2+9x-70=0$$

$$(x+14)(x-5)=0$$

Set each factor equal to 0 and solve for x.

$$x+14=0$$

$$x=-14$$

and

$$x - 5 = 0$$

$$x = 5$$

Since x is a positive length, x cannot equal -14. Therefore, $x = 5$.

7. C. The surface area of a pyramid is

$$SA = B + \frac{1}{2}pl$$

where

B is the area of the base

p is the perimeter

l is the slant height

From the figure, we know $B = 3^2 = 9$ and $p = 3 + 3 + 3 + 3 = 12$ and $l = 4$.

$$SA = 9 + \frac{1}{2}(12)(4) = 9 + 6(4) = 9 + 24 = 33$$

8. B. To find the contrapositive of a statement switch the "if part" and the "then part," and negate both parts. So the contrapositive

statement is "If a figure does not have four congruent sides, then it's not a square."

9. This is a special $30^\circ - 60^\circ - 90^\circ$ triangle, and therefore the pattern for the sides is x, $x\sqrt{3}$, $2x$, where x is the short side, $x\sqrt{3}$ is the long side, and $2x$ is the hypotenuse. We've been given that the hypotenuse is 8.

$$2x = 8$$

$$\frac{2x}{2} = \frac{8}{2}$$

$$x = 4$$

So the short side is $a = 4$ and the long side is $b = 4\sqrt{3}$.

10. The volume of a cylinder is $V = \pi r^2 h$, where r is the radius and h is the height. We know that $r = 3$ and $h = 6$, so the volume of the cylinder is

$$V = \pi(3)^2 \cdot (6) = 9(6)\pi = 54\pi$$

The volume of a sphere is

$$V = \frac{4}{3}\pi r^3 = \frac{4}{3}\pi(3)^3 = \frac{4}{3}\pi(27) = 36\pi$$

The difference between the volumes is

$$54\pi - 36\pi = 18\pi \text{ cm}^3$$

11. To find the diagonal of a rectangular solid, use the formula

$$\sqrt{x^2 + y^2 + z^2}$$

In this case, $x = 6$, $y = 3$, and $z = 4$, so

$$\sqrt{5^2 + 3^2 + 4^2}$$

$$\sqrt{25 + 9 + 16}$$

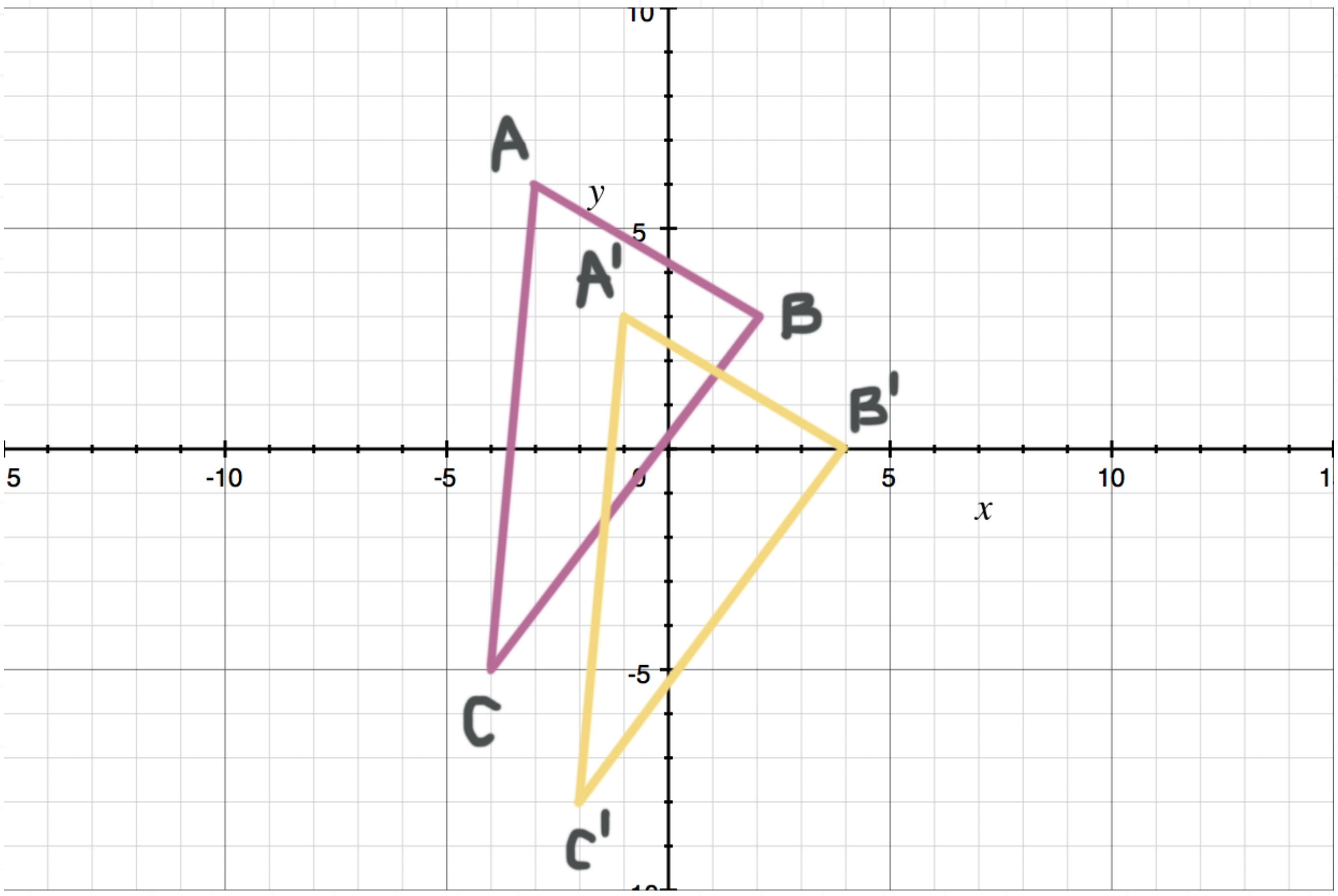
$$\sqrt{50}$$

Simplify the square root.

$$\sqrt{50} = \sqrt{25} \cdot \sqrt{2}$$

$$5\sqrt{2}$$

12. Since the translation is $T(x, y) = (x + 2, y - 3)$, we need to find each point of the triangle. Then we need to add 2 to each x-coordinate and subtract 3 from each y-coordinate.



The vertices A and A' are

$$A(-3,6)$$

$$A'(-3+2,6-3)$$

$$A'(-1,3)$$

The vertices B and B' are

$$B(2,3)$$

$$B'(2+2,3-3)$$

$$B'(4,0)$$

The vertices C and C' are

$$C(-4,-5)$$

$$C'(-4+2,-5-3)$$

$$C'(-2,-8)$$

So the vertices of the new translated triangle are $A'(-1,3)$, $B'(4,0)$, and $C'(-2,-8)$.

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