Geometry
Final Exam Solutions

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MATH

Geometry Final Exam Answer Key

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

9. (15 pts) $x = 4\sqrt{6}$

10. (15 pts) $\frac{256}{3}\pi$ cm^3

11. (15 pts) 9.5 feet

12. (15 pts) $A'(2,3)$, $B'(0,2)$, $C'(0,3)$

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1. E. We'll use the formula for the interior angles of a regular polygon.

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

An octagon has 8 sides, which means that $n = 8$.

$$\frac{(n-2)180}{n} = \frac{(8-2)180}{8} = \frac{(6)180}{8} = \frac{1,080}{8} = 135^\circ$$

2. D. Consecutive interior angle pairs are supplementary, so

$$(3x+8)+(2x+7) = 180$$

$$5x + 15 = 180$$

$$5x = 165$$

$$x = 33$$

3. A. Find the midpoint of $\overline{AB}$ using the midpoint formula.

$$M = \left(\frac{x_1+x_2}{2}, \frac{y_1+y_2}{2}\right) = \left(\frac{1+7}{2}, \frac{3+7}{2}\right) = \left(\frac{8}{2}, \frac{10}{2}\right) = (4,5)$$

The midpoint of $\overline{AB}$ is at $(4,5)$.

4. C. All sides are congruent on a rhombus, and the diagonals are perpendicular bisectors, so we can use the Pythagorean theorem to find the hypotenuse of any of the four right triangles within the rhombus.

Since $\overline{LN} = 10$ then $\overline{LO} = 5$, and we're told that $\overline{OK} = 12$, which means we can use the Pythagorean theorem to find $\overline{KL}$.

$$5^2 + 12^2 = c^2$$

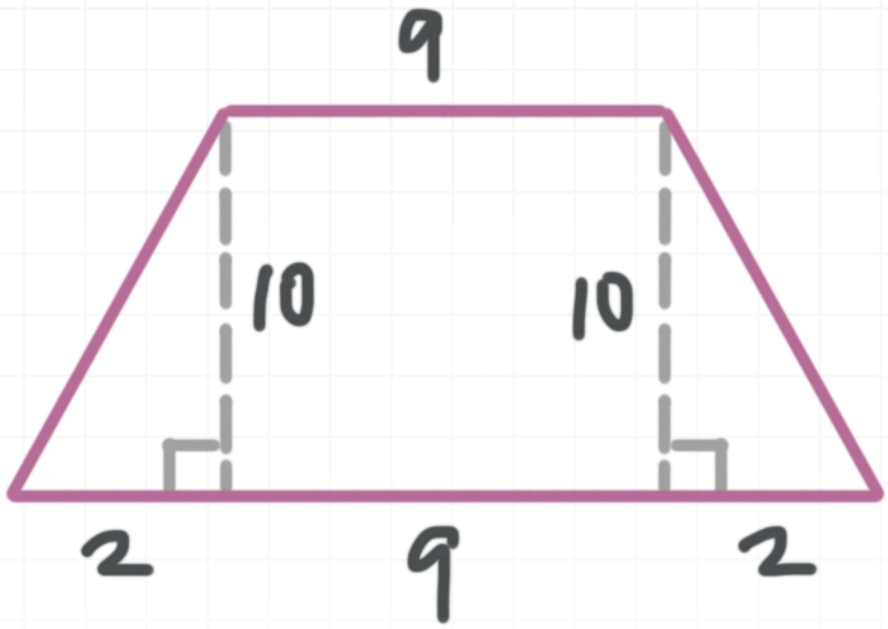
$$25 + 144 = c^2$$

$$169 = c^2$$

$$13 = c$$

Since one side of the rhombus is 13 units, then the perimeter is $P = 4s = 4(13) = 52$ units.

5. C. In the drawing, the two segments of length 10 form a rectangle with the bases of the trapezoid.



The base of the rectangle is 9, which means the longer base of the trapezoid has length

$$2 + 9 + 2 = 13$$

So the area of the trapezoid must be

$$A = \frac{1}{2}(9 + 13)(10)$$

$$A = \frac{1}{2}(22)(10)$$

$$A = \frac{1}{2}(220)$$

$$A = 110$$

6. B. In the triangle, segment $\overline{DE}$ is parallel to side $\overline{BC}$, so the segment splits the lengths of sides $\overline{AB}$ and $\overline{AC}$ of the triangle proportionally.

$$\frac{\overline{AD}}{\overline{DB}} = \frac{\overline{AE}}{\overline{EC}}$$

Since $\overline{AD} = 8$ and $\overline{AB} = 2x + 10$, $\overline{BD} = 2x + 10 - 8 = 2x + 2$. Plug these values into the proportion,

$$\frac{8}{2x + 2} = \frac{6}{15}$$

then use cross multiplication to solve for x.

$$8(15) = 6(2x + 2)$$

$$120 = 12x + 12$$

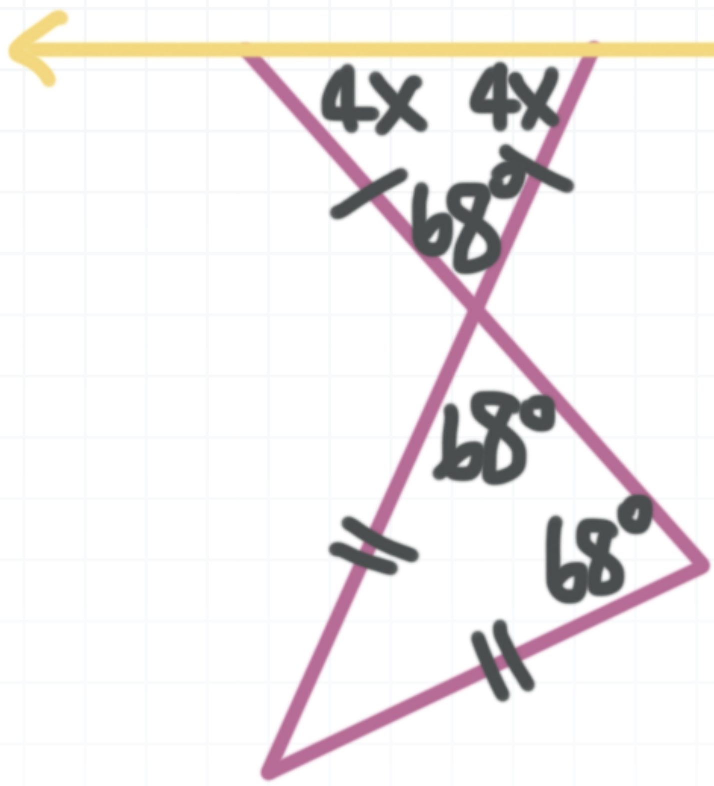
$$108 = 12x$$

$$9 = x$$

To find the length of $\overline{BD}$, plug $x = 9$ into $2x + 2$.

$$2(9) + 2 = 18 + 2 = 20$$

7. E. The base angles of an isosceles triangle are congruent and vertical angles are congruent, so we can fill in the figure with more information.



The measures of the interior angles of a triangle always sum to 180°, so

$$4x + 4x + 68^\circ = 180^\circ$$

$$8x + 68^\circ = 180^\circ$$

$$8x = 112^\circ$$

$$x = 14^\circ$$

8. D. The conditional statement that matches the Euler diagram is, “If it’s an iPhone, then it’s an Apple product.”

9. This is a special $45^\circ - 45^\circ - 90^\circ$ triangle, and therefore the pattern for the sides is x, x, $x\sqrt{2}$, where x is the length of the two legs of the

right triangle, and $x\sqrt{2}$ is its hypotenuse. We know that the hypotenuse is $4\sqrt{12}$, so

$$x\sqrt{2} = 4\sqrt{12}$$

$$x\sqrt{2} = 4\sqrt{6 \cdot 2}$$

$$x\sqrt{2} = 4\sqrt{6}\sqrt{2}$$

$$x = 4\sqrt{6}$$

So the short sides are $x = 4\sqrt{6}$.

10. The volume of a cone is $V = (1/3)\pi r^2 h$, where r is the radius and h is the height. We know that $r = 4$ and $h = 8$, so the volume of the cone is

$$V = \frac{1}{3}\pi(4)^2(8) = \frac{128}{3}\pi$$

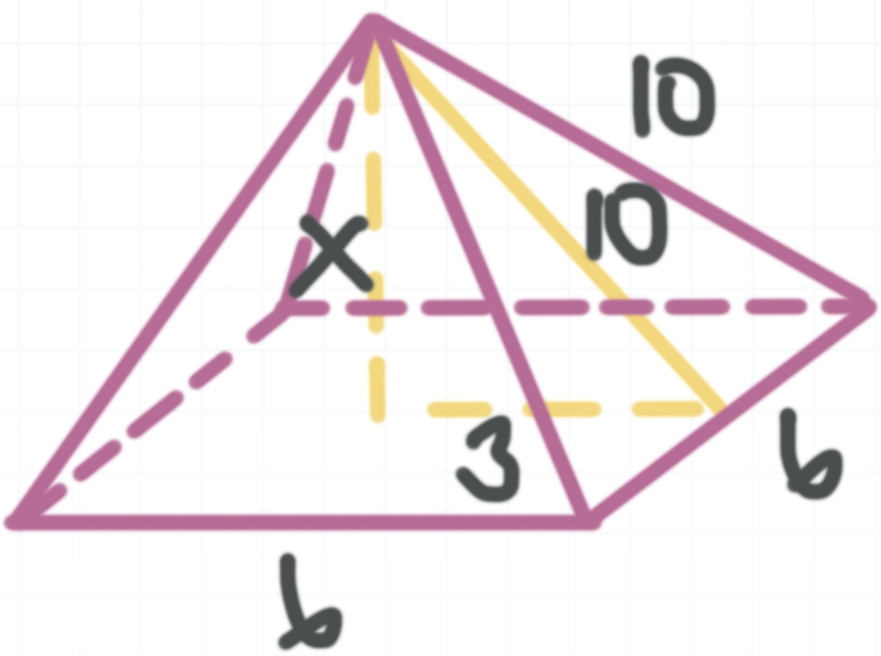
The volume of a cylinder is $V = \pi r^2 h$, where r is the radius and h is the height. We know that $r = 4$ and $h = 8$, so the volume of the cone is

$$V = \pi(4)^2(8) = 128\pi$$

The difference between the volumes is

$$128\pi - \frac{128}{3}\pi = \frac{256}{3}\pi \text{ cm}^3$$

11. The height of the pyramid creates a right triangle with the pyramid's base and slant height.



Use the Pythagorean theorem to find the height of the pyramid, which is a leg of the right triangle. The short leg of the triangle is half the length of the base of the pyramid, and the hypotenuse of the triangle is the slant height of the pyramid. Substitute $b = 3$ and $c = 10$ into the formula.

$$a^2 + b^2 = c^2$$

$$x^2 + 3^2 = 10^2$$

$$x^2 + 9 = 100$$

$$x^2 = 91$$

$$x = \sqrt{91} \approx 9.5 \text{ feet}$$

12. The rule of a 270° counterclockwise rotation about the origin is $(x, y) \to (y, -x)$.

The vertices A and A' are

$$A(-3,2)$$

$$A'(2,3)$$

The vertices B and B' are

$$B(-2,0)$$

$$B'(0,2)$$

The vertices C and C' are

$$C(-3,0)$$

$$C'(0,3)$$

So the vertices of the new rotated triangle are $A'(2,3)$, $B'(0,2)$, and $C'(0,3)$.

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