

1.	<i>a. A b. C</i>
2.	<i>7.71</i>
3.	<i>24.63</i>
4.	<i>39.47°</i>
5.	<i>15√2</i>
6.	<i>x = 4, y = 4√3</i>
7.	<i>x = 13, y = 5</i>
8.	<i>11</i>
9.	<i>x = 8, y = 16</i>
10.	<i>33.06°</i>
11.	<i>28.96°</i>
12.	<i>6√2</i>
13.	<i>x = 6√15, y = 18√5</i>
14.	<i>3293.32 ft</i>
15.	<i>C</i>
16.	<i>a. 32 b. 18</i>
17.	<i>a. True b. True c. True d. False e. False</i>
18.	<i>120 + 18π ≈ 176.55 cm²</i>
19.	<i>256 - 64π ≈ 54.94 in²</i>
20.	<i>48π + 64 ≈ 214.80 ft²</i>
21.	<i>Right Triangle</i>
22.	<i>Obtuse Triangle</i>
23.	<i>Acute Triangle</i>
24.	<i>D</i>
25.	<i>A</i>
26.	<p><i>Given:</i> $\triangle ABC$ with vertices $A(0,0), B(2a,0), C(0,2a)$ M is the midpoint of \overline{BC}</p> <p><i>Prove:</i> $\overline{MA} \perp \overline{CB}$</p> <p><i>Proof:</i> The coordinates of the midpoint $M\left(\frac{0+2a}{2}, \frac{2a+0}{2}\right) \rightarrow M(a,a)$</p> <p><i>Slope of $\overline{AM} = \frac{a-0}{a-0} = \frac{a}{a} = 1$</i></p>

$$\text{Slope of } \overline{CB} = \frac{2a - 0}{0 - 2a} = \frac{2a}{-2a} = -1$$

Since the slopes of \overline{AM} and \overline{CB} are opposite reciprocals (or their product is -1), then $\overline{MA} \perp \overline{BC}$

27.

Given: *Quadrilateral ROTS with vertices* $O(0,0), R(2a,2b), S(2c,2d), T(2e,0)$
 With midpoints of sides P, Q, M, N as shown below.

Prove: $PQMN$ has sides that are opposite and congruent.

Sample Response:

Proof:

The coordinates of $PQMN$ are

$P(a,b), Q(a+c,b+d), M(c+e,d), N(e,0)$

$$\text{Slope of } \overline{PQ} = \frac{b+d-b}{a+c-a} = \frac{d}{c}$$

$$\text{Slope of } \overline{MN} = \frac{d-0}{c+e-e} = \frac{d}{c}$$

Therefore, $\overline{PQ} \parallel \overline{MN}$

$$\text{Slope of } \overline{PN} = \frac{b-0}{a-e} = \frac{b}{a-e}$$

$$\text{Slope of } \overline{QM} = \frac{b+d-d}{a+c-c-e} = \frac{b}{a-e}$$

Therefore, $\overline{PN} \parallel \overline{QM}$

$$PQ = MN = \sqrt{b^2 + c^2}$$

$$PM = QN = \sqrt{(a-e)^2 + b^2}$$

Therefore, the opposite sides are congruent.

28. a. $x = 10$ b. $x = 32$

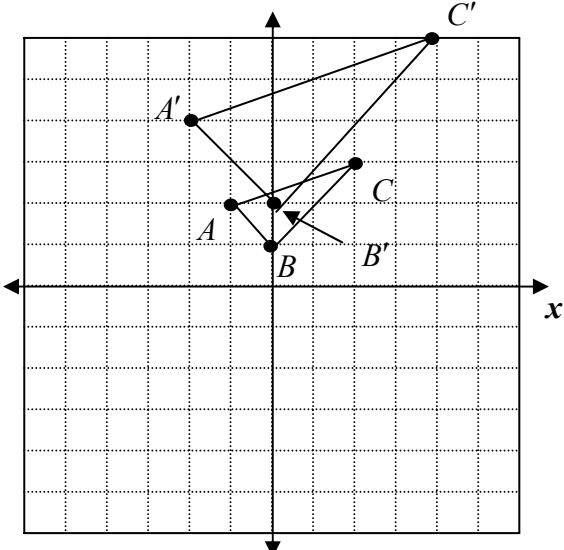
29. a. True b. True c. False d. False e. True

30. Surface Area = $192\pi \approx 603.19$; Volume $360\pi \approx 1130.97$

31. Surface Area = $432 + 108\sqrt{3} \approx 619.06$ Volume = $648\sqrt{3} \approx 1122.37$;

32. Slant Height = 5; Surface Area = 96, Volume = 48

33. Slant Height = 5; Surface Area = $24\pi \approx 75.40$, Volume = $12\pi = 37.70$

34.	<i>Surface Area</i> = $64\pi \approx 201.06\text{cm}^2$, <i>Volume</i> = $\frac{256\pi}{3} \approx 268.08\text{cm}^3$	
35.	a. $325\pi \approx 1021.02$	b. $576\pi \approx 1809.56$
36.	25 : 49	
37.	4 : 9	
38.	C	
39.	B	
40.	D	
41.	C	
42.	a. $\sqrt{83} \approx 9.11$	b. <i>the longest segment inside the prism</i>
43.	8 in^3	
44.	a. $\sqrt{18} = 3\sqrt{2}$	b. $\sqrt{50} = 5\sqrt{2}$ c. $\sqrt{45} = 3\sqrt{5}$
45.	 <p><i>Sample Response:</i></p> <ul style="list-style-type: none"> The triangle is right. $AB = \sqrt{2}, BC = \sqrt{8}, AC = \sqrt{10}$ Since $AC^2 = BC^2 + AB^2$, by the converse of the Pythagorean theorem, the triangle is right. It's area is $\frac{1}{2} \cdot \sqrt{2} \cdot \sqrt{8} = \frac{1}{2} \sqrt{16} = \frac{1}{2} \cdot 4 = 2$ $A'(-2, 4), B'(0, 2), C'(4, 6)$ The ratio of the areas of the image to the pre-image is 4:1. Since the linear dimensions doubled, the area increases by a factor of 4. 	
46.	4	

47.	<p><i>Sample responses</i></p> <p>a. <i>The triangles are similar by the AA similarity postulate. Since $\overline{AB} \parallel \overline{DE}$, $\angle A \approx \angle E$ because they are alternate interior angles of 2 parallel lines cut by a transversal, $\angle B \cong \angle D$</i></p> <p>b. <i>The triangles are similar by the SAS similarity postulate. The angles at C are congruent vertical angles. The ratio of corresponding sides $BC:CD = 14:21 = 2:3$, which is the same ratio as the ratio of the corresponding sides $AC:CE$.</i></p> <p>c. <i>The triangles are not similar. The corresponding sides are proportional, but the angle C is NOT the included angle.</i></p>
48.	B
49.	D
50.	<p>42</p> <p><i>Sample response:</i></p> <p><i>Parallel lines to a side of a triangle that intersect the other two sides divide those sides proportionally.</i></p> $\frac{CE}{9} = \frac{2}{3}, CE = 6$ $\frac{EG}{6} = \frac{2}{3}, EG = 4$ $\frac{FG}{18} = \frac{8}{12}, FG = 12$ <p><i>The perimeter of AFG = $3 + 9 + 6 + 12 + 4 + 6 + 3 = 42$</i></p>
51.	<p><i>Sample responses:</i></p> <p>$r = 10$</p> <p><i>Since the cones are similar, their corresponding parts are proportional.</i></p> $\frac{6}{4} = \frac{15}{r}, r = 10 .$ <p><i>Ratio of volumes = $\frac{8}{125}$</i></p> <p><i>The ratio of the volumes is cube of the ratio of the linear dimensions.</i></p> $\left(\frac{2}{5}\right)^3 = \frac{8}{125}$
52.	A
53.	C

54.

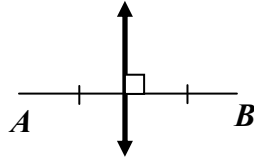
$$m\angle 1 = 90^\circ \quad m\angle 2 = 50^\circ \quad m\angle 3 = 90^\circ$$

$$m\angle 4 = 50^\circ \quad m\angle 5 = 60^\circ$$

$$m\angle 6 = 90^\circ \quad m\angle 7 = 30^\circ \quad m\angle 8 = 20^\circ$$

$$m\angle 9 = 90^\circ \quad m\angle 10 = 40^\circ$$

55. *A line that is the perpendicular bisector of \overline{AB}*



56. $20\pi \approx 62.83 \text{ cm}^2$

57. $16\pi - 32 \approx 18.27 \text{ cm}^2$

58. $108\pi - 81\sqrt{3} \approx 198.996 \text{ cm}^2$

59. *Corresponding angles are congruent, corresponding sides are proportional.*

60. a. $OW = 6$ b. $LM = 16$

61. *A plane that is the perpendicular bisector of \overline{AB}*

62. C

63. 6

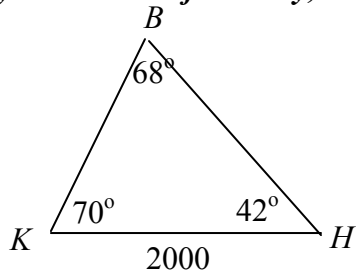
64. *Sample responses:* $\frac{HK}{GK} = \frac{GK}{FK}, \frac{GK}{FG} = \frac{GH}{FH}, \frac{GH}{GH} = \frac{FG}{FH}$

65. 90°

66. -1

67. *Sample responses:*

- *Kyle is 1443.36 feet away, Holly is 2026.98 feet away.*



Find HB by the Law of Sines

$$\frac{\sin 68^\circ}{2000} = \frac{\sin 70^\circ}{HB}$$

$$HB = \frac{2000 \sin 70^\circ}{\sin 68^\circ} \approx 2026.98$$

Find BK by the Law of Sines

$$\frac{\sin 68^\circ}{2000} = \frac{\sin 42^\circ}{BK}$$

$$BK = \frac{2000 \sin 42^\circ}{\sin 68^\circ} \approx 1443.36$$

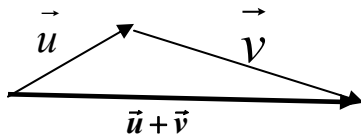
- **1356.31 ft high**
Draw an altitude from point B to segment KH. Using right triangle trigonometry,

$$\sin 70^\circ = \frac{h}{1443.36}$$

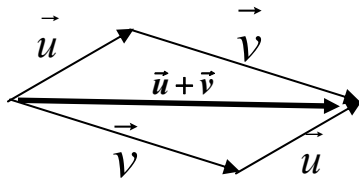
$$h = 1443.36 \sin 70^\circ = 1356.31$$

68. **2.57 miles**
Sample response:
Let d = the distance between Farreed and Kim. Using the Law of Cosines,
 $d^2 = 3^2 + 4^2 - 2 \cdot 3 \cdot 4 \cos 40^\circ$
 $d^2 = 6.6149\dots$
 $d \approx 2.57$

69. **Head to Tail**



Parallelogram



70. a. $\sqrt{52} = 2\sqrt{13} \approx 7.21\text{mph}$ b. 33.69°