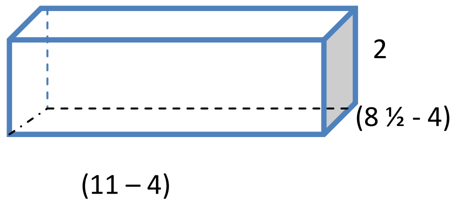
MATH 097 Review Answers

1.



$V = l \cdot w \cdot h$

$V = (11-4)(8\frac{1}{2} - 4)(2)$

V = 63 cubic inches

2. $A = \pi r^2$

$C = 2\pi r \rightarrow r = \frac{C}{2\pi}$ so $A = \pi r^2 = \pi\left(\frac{C}{2\pi}\right)^2 = \pi\left(\frac{C^2}{4\pi^2}\right) = \frac{C^2}{4\pi}$

Thus $A = = \frac{C^2}{4\pi}$

3. $d = 3 \rightarrow r = \frac{3}{2}$

Area paper - Area circles = Remaining area

$l \cdot w \quad - \quad 4 \cdot \pi r^2 \quad = \quad A$

$(11)(8\frac{1}{2}) \quad - \quad 4 \cdot \pi\left(\frac{3}{2}\right)^2 \quad = \quad A$

$93\frac{1}{2} \quad - \quad 9\pi \quad = \quad A$

If $\pi \approx 3.14$, A = 65.24 square inches

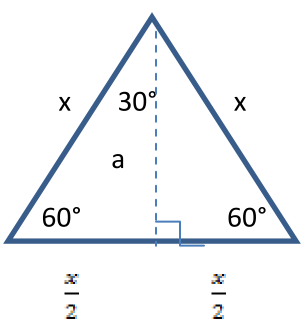
4. $x = 40^\circ$, $y = 60^\circ$, $z = 120^\circ$

5. $x^2 + x^2 = h^2$

$2x^2 = h^2$

$x\sqrt{2} = h$ so if side $x = 1$, then $h = \sqrt{2}$

6.



Draw altitude, a, in equilateral triangle, forming two congruent triangles (HL Theorem). If the side of the equilateral triangle is x, then by the Pythagorean Theorem, $\left(\frac{x}{2}\right)^2 + a^2 = x^2$

$a^2 = x^2 - \frac{x^2}{4}$

$a^2 = \frac{3}{4}x^2$, so $a = \frac{x\sqrt{3}}{4}$

If $x = 2$, then $a = \sqrt{3}$, and $\frac{x}{2} = 1$

7. From #6 above, $\left(\frac{x}{2}\right)^2 + 3^2 = x^2$

$$9 = \frac{3}{4}x^2$$

$$\frac{36}{3} = x^2$$

$$x = \sqrt{12}$$

A = ½ b h

$b = x = \sqrt{12}$, $h = 3$

$A = \frac{1}{2}(\sqrt{12})(3)$

$A = \frac{3}{2}\sqrt{4}\ (\sqrt{3})$

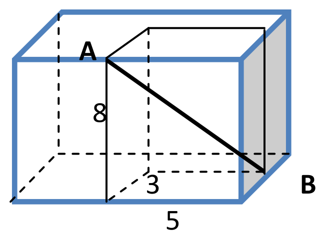
$A = 3\sqrt{3}$ square inches

8. $d^2 = \ell^2 + w^2 + h^2$

$d^2 = 4^2 + 3^2 + 2^2$

$d^2 = 29$, so $d \approx 5.385$ inches

9.

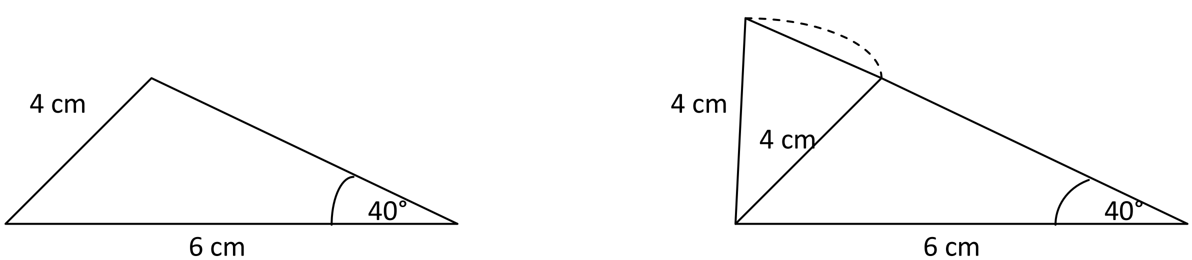


$\overline{AB}$ forms the diagonal of a smaller box with dimensions 5 x 3 x 8 cm.

$AB^2 = 5^2 + 3^2 + 8^2 = 98$

$AB = \sqrt{98} \approx 9.899$ cm

10.



These data fit SSA, so the solution may not be unique. Two different triangles satisfy data.

11.

Impossible
(Triangle Inequality)

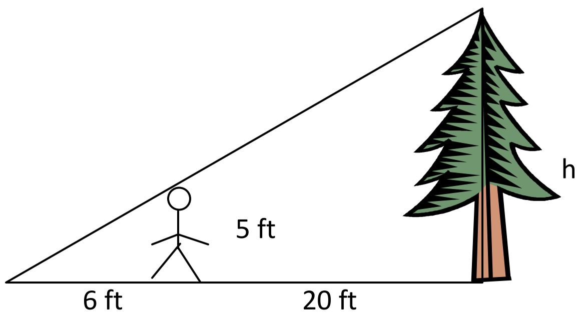
12. Because of symmetry, and the definition of isosceles, HB = 2.

By similar triangles, $\frac{5}{8} = \frac{x}{HB}$. So x = $\frac{(5)(2)}{8}$ = 1.25 cm

13. tan 50° = $\frac{x}{2.4}$ so x = (2.4)(tan 50)

x ≈ 2.86 cm

14.



$\frac{5}{6} = \frac{h}{20+6}$ by similar triangles

6h = 5(26)

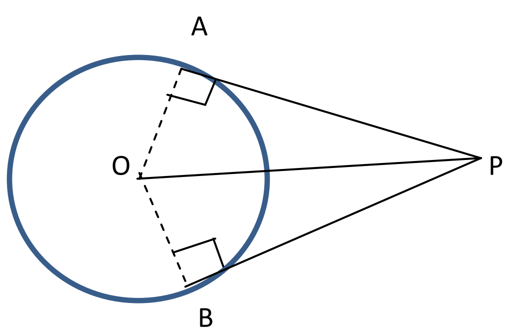
h = $21\frac{2}{3}$ ft

15. $V_1 = \ell \cdot w \cdot h$

$V_2 = (2\ell) \cdot (2w) \cdot (2h)$

$V_2 = 8\ell wh = 8V_1$ The second box has 8 times the volume of the first box.

16.



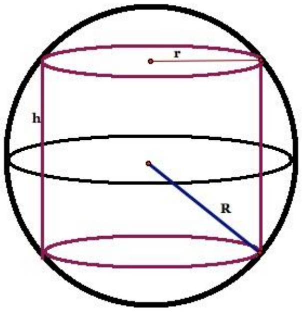
∠APB = 40° (Given)
∠PAO = ∠PBO = 90° (Fact A)

ΔAPO ≅ ΔBPO

($\overline{AP} \cong \overline{BP}$, Fact B;
$\overline{OA} \cong \overline{OB}$, radii
$\overline{OP} \cong \overline{OP}$, SSS)

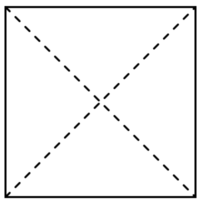
∠APO = 20°, ∠AOP = 70°
∠AOB = 140° which is the central angle
So Arc AB = 140° (Fact C)

17.

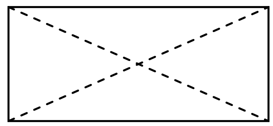


R = diameter of sphere; r = diameter of cylinder base; h = height of cylinder

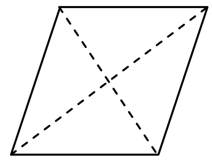
18.



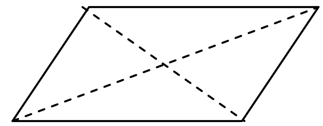
Square



Rectangle

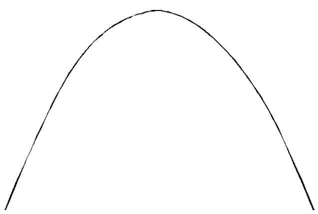


rhombus



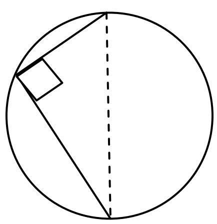
parallelogram

19.



parabola

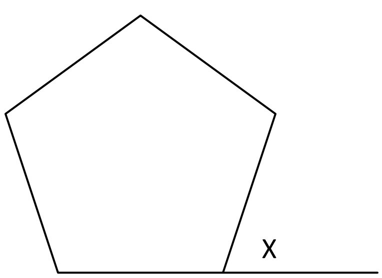
20.



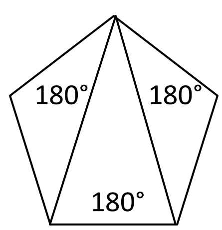
A right angle

(The intercepted arc is 180°, so the angle measures 90°.)

21.



X is the exterior angle. The measure of X can be found b finding the size of each inside angle and subtracting from 180°.

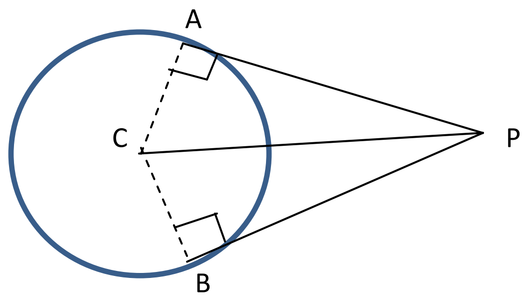


$$X = 180° - \frac{3(180)°}{5}$$

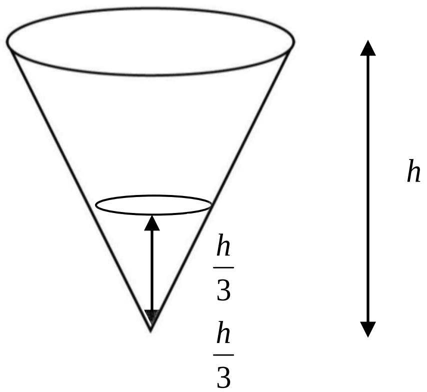
$$X = 72°$$

22. $\overline{CA} \perp \overline{PA}$, $\overline{CB} \perp \overline{PB}$

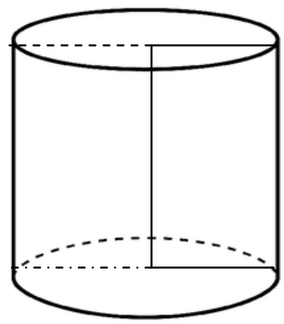
$PA = PB$



23.

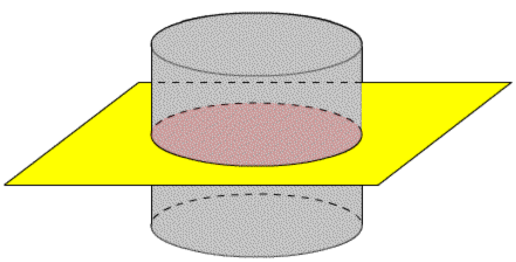


24.



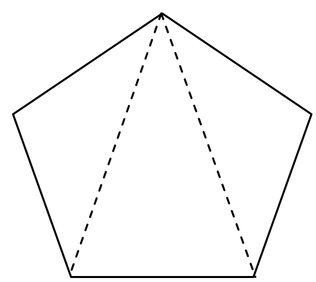
Obtain a cylinder

25.



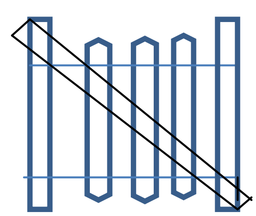
Cross-section is a circle

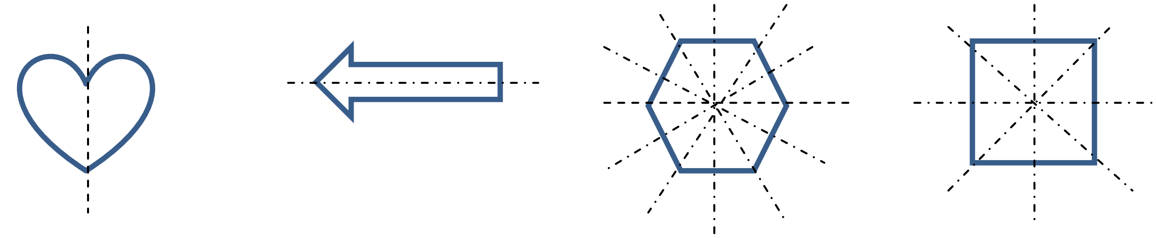
26.



Two diagonals will "triangulate" the pentagon and make it rigid.

27. The gate needs a diagonal to make it rigid.



28. 

29. Shapes a, c, d, and e

30. First find slope between (4, 5) and (2, -3) Slope = $\frac{5-(-3)}{4-2} = \frac{8}{2} = 4$

Use either point in the formula $y - y_1 = m(x - x_1)$

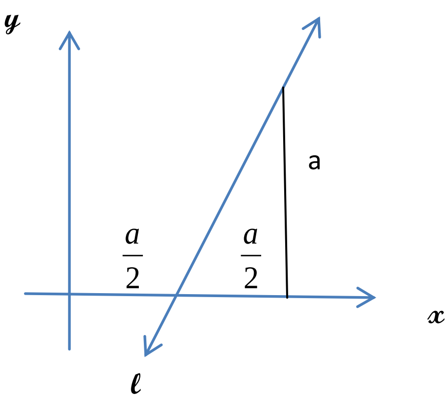
Using (4, 5): $y - 5 = 4(x - 4)$
$y = 4x - 16 + 5$
$y = 4x - 11$

Using (2, -3): $y + 3 = 4(x - 2)$
$y = 4x - 8 - 3$
$y = 4x - 11$

31. Yes, because their slopes are negative reciprocals of each other.

$y = 3x$ has a slope of 3

$3y + x = 0$
$3y = -x$
$y = -\frac{1}{3}x$, which has a slope of $-\frac{1}{3}$

32. 

Using the points (a, a) and ($\frac{a}{2}$, 0) to get

slope: $\frac{a-0}{\frac{a}{2}-0} = \frac{a}{\frac{a}{2}} = 2$

$y - y_1 = m(x - x_1)$

$y - 0 = 2(x - \frac{a}{2})$

$y = 2x - a$