

1.1 The Three Dimensions

Answers

1. Possible answer: You need only one number to describe the location of a point on a line. You need two numbers to describe the location of a point on a plane.
2. Answers vary. Possible answer: a string.
3. Answers vary. Possible answer: the surface of a desk.
4. Answers vary. Possible answer: a person.
5. F, G, A, or D.
6. A or H.
7. A, B, C, D, E, or F.
8. AB, BC, AC, CD, DE, EF, AF, BE, DF
9. ABC, ABE, CBE, DEF, AFD
10. C, E, or F.
11. Answers vary depending on answer to #10.
12. D or B
13. 2
14. 1
15. 3

1.2 Angles and Lines

Answers

1. A line segment has two endpoints, a ray has one endpoint, and a line has no endpoints.
2. Answers vary. Angle should be 90° .
3. Answers vary. Angle should be between 90° and 180° .
4. Answers vary. Angle should be less than 90° .
5. A straight angle is 180° so two angles that make a straight angle must have measures that add to 180° . This is the definition of supplementary angles.
6. The measures of the angles are 40.4° and 49.6° .
7. The measures of the angles are 76.4° and 103.6° .
8. Answers vary. Possible answer: $\angle ABC$ and $\angle FBG$.
9. Answers vary. Possible answer: $\angle CBF$.
10. Answers vary. Possible answer: $\angle ABC$ and $\angle ABF$.
11. $m\angle ABF = 110^\circ$
12. $m\angle FBG = 70^\circ$
13. Perpendicular lines meet at right angles. Their slopes are opposite reciprocals.
14. $\angle K$ is obtuse.
15. Using a protractor, the angle is about 122° .

1.3 Polygons

Answers

1. 8°
2. 5940°
3. Answers vary.
4. octagon
5. decagon
6. quadrilateral
7. The hexagon and its interior angles have been divided into 4 triangles. The sum of the angles of each triangle is 180° . Therefore, the sum of the interior angles of the hexagon is $180^\circ \cdot 4 = 720^\circ$.
8. The hexagon has been split into 6 triangles, but the angles in the triangles are not just interior angles. The 6 triangles are all of the interior angles + 360° from angles forming the central circle. Therefore, the sum of the interior angles is $180^\circ \cdot 6 - 360^\circ = 720^\circ$.
9. 12 sides
10. If the interior angle is 150° then the exterior angle is 30° . A regular polygon with an exterior angle of 30° has $\frac{360^\circ}{30^\circ} = 12$ sides.
11. 360°
12. 3240°
13. $x = 48$
14. $x = 17.6$
15. $x \approx 21.1^\circ$

1.4 Triangles

Answers

1. scalene, isosceles, equilateral
2. acute, right, obtuse, equiangular
3. No, because equiangular triangles have all angles 60° . A right triangle must have one angle that is 90° .
4. Isosceles and obtuse.
5. Scalene and obtuse.
6. $x = 41$
7. $m\angle C = 41^\circ, m\angle A = 94^\circ, m\angle B = 45^\circ$
8. $x = 25.86$
9. $m\angle F = 25.86^\circ, m\angle D = 102.44^\circ, m\angle E = 51.72^\circ$
10. Longest: \overline{EF} ; Shortest: \overline{DE} .
11. $\overline{GH}, \overline{FH}, \overline{GF}$
12. $\angle K, \angle L, \angle J$
13. The measure of one interior angle is 80° and the sum of the measures of the other interior angles is 100° .
14. $x = 62.5$
15. 123°

1.5 Quadrilaterals

Answers

1. Always true.
2. Sometimes true.
3. Always true.
4. Always true.
5. Always true.
6. Never true.
7. Must be a rectangle (and therefore a parallelogram), could be a square.
8. Must be a quadrilateral. Could be a kite, parallelogram, rectangle, rhombus, or square depending on which sides are congruent and additional properties.
9. Possible conjectures: diagonals are perpendicular, one diagonal bisects the other, one diagonal bisects its angles.
10. Possible conjectures: diagonals are congruent, diagonals bisect each other.
11. Possible conjectures: diagonals are perpendicular, diagonals bisect each other.
12. Possible conjecture: one pair of opposite angles are congruent.
13. $x = 5.2$
14. $x = 6$
15. Adjacent angles are supplementary. This is due to the fact that the sum of the measures of the four interior angles is 360° and the opposite angles are congruent.

1.6 Area or Perimeter of Triangles and Quadrilaterals

Answers

1. Perimeter is 54 inches and area is 180 in^2 .
2. Perimeter is 12 cm and area is 6 cm^2 .
3. Area is 72 cm^2 .
4. The length is 60 cm.
5. $\sqrt{30}$ cm
6. 6 in, 8 in, 10 in.
7. Area is the number of **square units** it takes to cover a shape. Area is a two dimensional measurement.
8. Perimeter is a one dimensional measurement. It is the sum of the **length** of the sides.
9. b_1 and b_2 are the parallel sides, but it doesn't matter which is which.
10. 72 in^2 (remember that a square is a rhombus)
11. A triangle is half a parallelogram with area bh .
12. A trapezoid is half a parallelogram with area $(b_1 + b_2)h$
13. $A = 90 \text{ cm}^2$
14. A square is a rectangle with base of "s" and height of "s". The $Area = bh = s \cdot s = s^2$.
15. Divide the kite into two triangles with base of d_1 and height of $\frac{d_2}{2}$. The area of each triangle is $\frac{d_1(\frac{d_2}{2})}{2} = \frac{d_1 d_2}{4}$. The area of the kite is $2\left(\frac{d_1 d_2}{4}\right) = \frac{d_1 d_2}{2}$.

1.7 The Pythagorean Theorem

Answers

1. $x \approx 16.9$

2. $x \approx 14$

3. $x \approx 2.3$

4. $x \approx 1.1$

5. $x = 6\sqrt{2} \approx 8.5$

6. obtuse

7. acute

8. right

9. acute

10. $d \approx 8.1$

11. $d \approx 6.8$

12. $d \approx 3.6$

13. $d \approx 13.6$

14. Answers vary. Common Pythagorean triples are 5, 12, 13 and 7, 24, 25.

15. $(n^2 - m^2)^2 + (2mn)^2 = n^4 - 2n^2m^2 + m^4 + 4m^2n^2$

$$= n^4 + 2n^2m^2 + m^4$$

$$= (n^2 + m^2)^2$$

1.8 Circles

Answers

1. $A = 9\pi \text{ in}^2; C = 6\pi \text{ in}$

2. $A = 36\pi \text{ in}^2; C = 12\pi \text{ in}$

3. $A = 56.25\pi \text{ cm}^2; C = 15\pi \text{ cm}$

4. $A = 121\pi \text{ in}^2; C = 22\pi \text{ in}$

5. $A = 256\pi \text{ cm}^2$

6. $C = 8\pi\sqrt{2} \text{ cm}$

7. $A = 112.5\pi \text{ cm}^2$

8. $P = 30 + 15\pi \text{ cm}$

9. $A = 18.75\pi \text{ cm}^2$

10. $P = 10 + 7.5\pi \text{ cm}$

11. $A = 0.15125\pi \text{ in}^2$

12. $P = 2.2 + 0.275\pi \text{ in}$

13. $A = 13.5\pi \text{ in}^2$

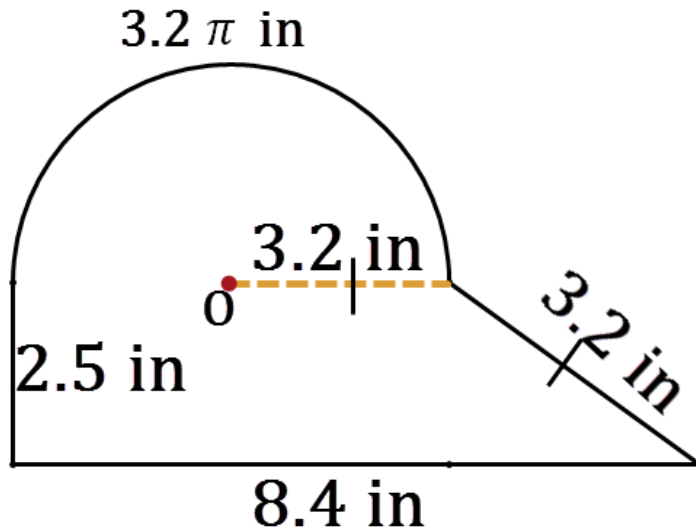
14. $P = 9 + 6\pi \text{ in}$

15. $\frac{Cr}{2} = \frac{(2\pi r)r}{2} = \frac{2\pi r^2}{2} = \pi r^2 = \text{Area of a Circle}$

1.9 Composite Shapes

Answers

1.



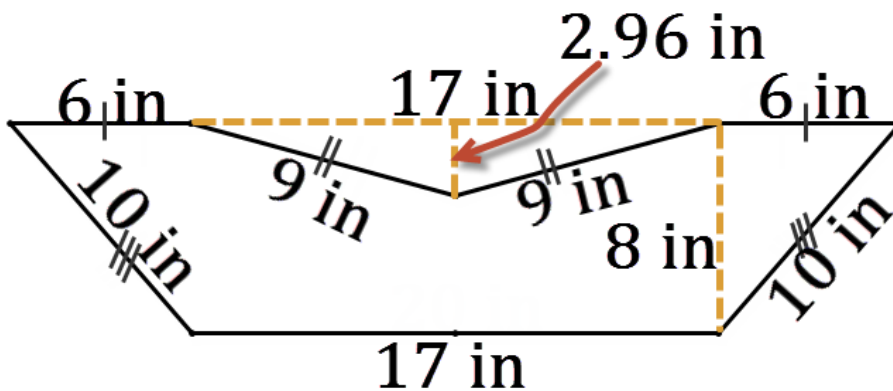
2. $P = 14.1 + 3.2\pi \text{ in}$

3. Answers vary.

4. $A = 18.5 + 5.12\pi \text{ in}^2$

5. Answers vary.

6.



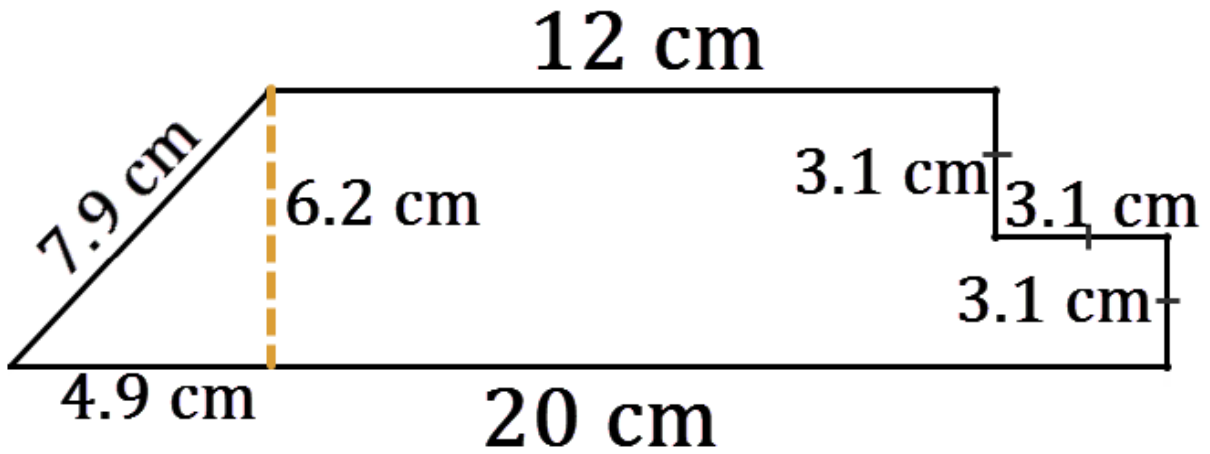
7. $P = 67 \text{ in}$

8. Answers vary.

9. $A = 158.84 \text{ in}^2$

10. Answers vary.

11.



12. $P = 49.2 \text{ cm}$

13. Answers vary.

14. $A = 99.2 \text{ cm}^2$

15. Answers vary.

1.10 Volume of Solids

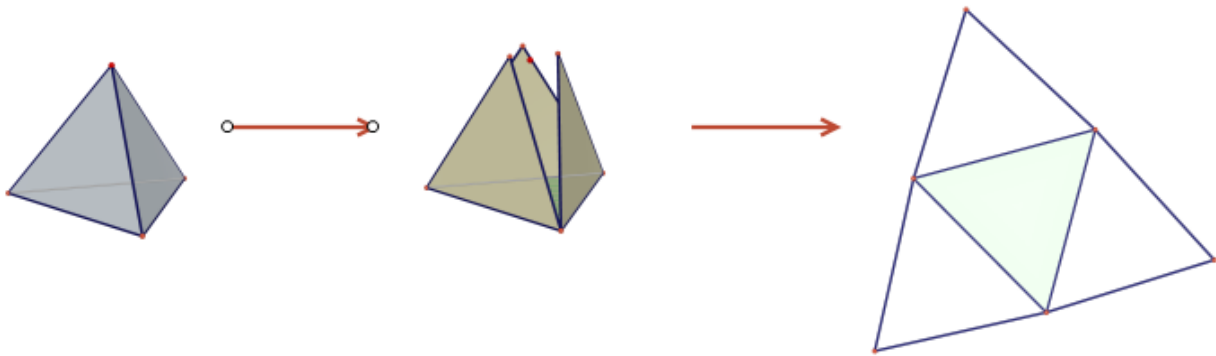
Answers

1. $2304\pi \text{ cm}^3$
2. $300\pi \text{ in}^3$
3. $73.872\pi \text{ cm}^3$
4. 243.2 in^3
5. 66.97 in^3
6. $84\pi \text{ cm}^3$
7. Answers vary. The area of the base tells you the volume of "one layer" of the prism.
8. A cylinder is like a prism with a circular base.
9. A pyramid is like a cone with a polygon base.
10. Both are the set of all points equidistant from a point. A circle is in two dimensions while a sphere is in three dimensions.
11. 7.238 liters
12. 0.23 liters
13. 0.29 gallons
14. 15 inches
15. 120 in^2

1.11 Surface Area and Nets

Answers

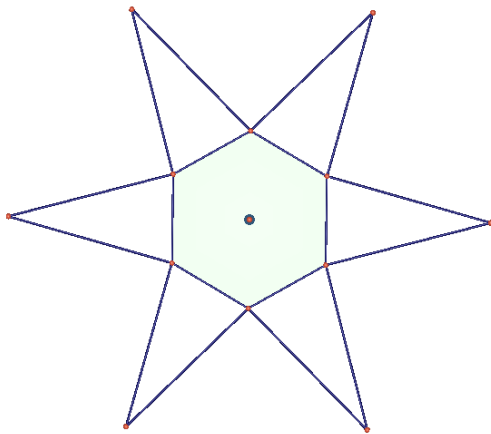
- The surface area of a solid is the area of its net.
- Surface area is a two dimensional measurement. It is the number of square units it would take to cover all the faces of a solid.
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4. 15.59 in^2

5. 62.35 in^2

6.

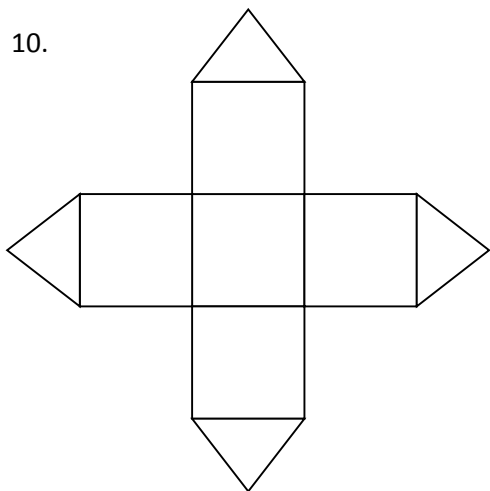


7. 374.12 in^2

8. 22.54 in

9. 1185.52 in^2

10.



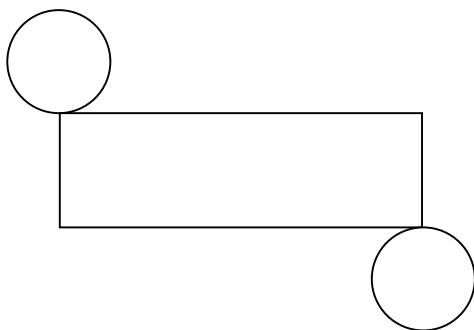
11. 10.26 in

12. 1312.8 in^2

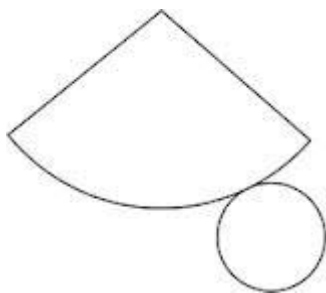
13. A triangular prism.

14. 665.7 in^2

15.



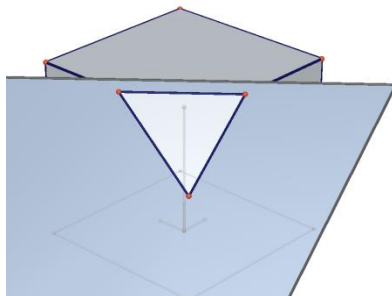
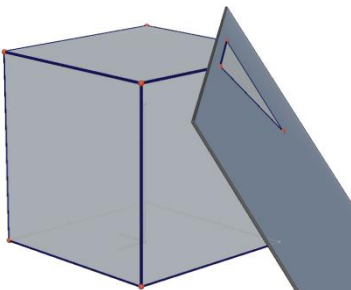
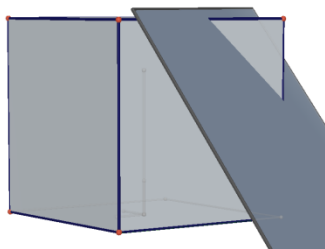
16.



1.12 Cross Sections of Solids

Answers

1. circles
2. pentagons, rectangles
3. pentagons, triangles
4. Yes, as shown below.



5. The cross section will be the same shape as the base.
6. The cross section is a triangle. The shape of the base does not matter.
7. A cross section that is parallel to the base.
8. $16\pi \text{ in}^2$
9. $36\pi \text{ in}^2$

10. The cross section is a square. When the plane reaches the pyramid portion of the solid, the square gets smaller as the plane gets further from the base.
11. The cross section is a rectangle with a triangle on top.
12. 247.5 in^2
13. The cross section is a circle. When the plane reaches the cone portion of the solid, the circle gets smaller as the plane gets further from the base.
14. The cross section is a rectangle with a triangle on top.
15. 198 in^2