



1. (1 point)

Stackable polystyrene cups have a height $h_1 = 11$ cm.

Two stacked cups have a height of $h_2 = 14$ cm.

Three stacked cups have a height of $h_3 = 17$ cm.

Find the equation for $h_x = \underline{\hspace{1cm}}x + \underline{\hspace{1cm}}$

Your friend is 185cm tall.

Find out how many cups you will need to reach the height of your friend. *cups* = $\underline{\hspace{1cm}}$

Correct Answers:

- 3
- 8
- 59

2. (1 point)

For the pairs of lines defined by the following equations indicate with an "I" if they are identical, a "P" if they are distinct but parallel, an "N" (for "normal") if they are perpendicular, and a "G" (for "general") if they are neither parallel nor perpendicular.

___ $3x + 4y + 5 = 0$ and $6x + 8y + 10 = 0$.

___ $3x + 4y + 5 = 0$ and $3x + 4y + 7 = 0$.

___ $3x + 4y + 5 = 0$ and $3x + 5y + 7 = 0$.

___ $-4x + 3y + 5 = 0$ and $3x + 4y + 7 = 0$.

Correct Answers:

- I
- P
- G
- N

3. (1 point) Solve the compound inequality: $-1 \leq 7 - 1x < 3$

Answer: $\underline{\hspace{2cm}}$

Correct Answers:

- $4 < x \leq 8$

4. (1 point) **Quadratic Equations.** Quadratic Equations don't always look like such. To obtain one you may have to carry out some sort of substitution or manipulate expressions suitably.

The equation

$$2x - 5\sqrt{x} + 2 = 0$$

has two real solutions. The smaller is $\underline{\hspace{1cm}}$, and the larger is $\underline{\hspace{1cm}}$.

The equation

$$2x^4 - 5x^2 + 2 = 0$$

has two positive real solutions. The smaller is $\underline{\hspace{1cm}}$, and the larger is $\underline{\hspace{1cm}}$.

The equation

$$\frac{1}{x-1} - \frac{x}{x+1} - 2 = 0$$

has two real solutions. The smaller is $\underline{\hspace{1cm}}$, and the larger is $\underline{\hspace{1cm}}$.

Correct Answers:

- 0.25
- 4
- 0.707106781186547
- 1.4142135623731
- -0.720759220056126
- 1.38742588672279

5. (1 point)

The vertex of the parabola defined by

$$f(x) = -5x^2 + 4x + 1$$

is the point $(\underline{\hspace{1cm}}, \underline{\hspace{1cm}})$.

Solution:

Solution: We have

$$\begin{aligned} f(x) &= -5x^2 + 4x + 1 \\ &= -5\left(x^2 - \frac{4}{5}x\right) + 1 \\ &= -5\left(x^2 - \frac{4}{5}x + \frac{4}{25}\right) + 1 + \frac{4}{5} \\ &= -5\left(x - \frac{2}{5}\right)^2 + \frac{9}{5} \end{aligned}$$

So the vertex is the point $\left(\frac{2}{5}, \frac{9}{5}\right)$.

Correct Answers:

- 0.4
- 1.8

6. (1 point) Suppose the solutions of a quadratic equation $p(x) = 0$ are 3 and -5 . Then that quadratic equation can be written as

$$p(x) = x^2 + \underline{\hspace{1cm}} x - \underline{\hspace{1cm}} = 0.$$

Hint: Think of $p(x)$ as $(x-3)(x+5)$.

Solution:

Solution:

$$p(x) = (x-3)(x+5) = x^2 + 2x - 15.$$

Correct Answers:

- 2
- 15

7. (1 point) Complete the square:

$$5x^2 + 9x + \underline{\hspace{1cm}} = 5(x + \underline{\hspace{1cm}})^2.$$

$$9x^2 - 7x + \underline{\hspace{1cm}} = 9(x - \underline{\hspace{1cm}})^2.$$

Correct Answers:

- 4.05
- 0.9
- 1.36111111111111
- 0.388888888888889

8. (1 point)

$$\frac{1 + \frac{1}{x}}{1 - \frac{1}{x}} = \underline{\hspace{1cm}} / \underline{\hspace{1cm}}.$$

(Enter your answer in such a form that the leading coefficient in the numerator equals 1.)

Hint: Multiply Numerator and Denominator with x .

Solution:

Solution: Multiplying numerator and denominator with x gives

$$\frac{1 + \frac{1}{x}}{1 - \frac{1}{x}} = \frac{x + 1}{x - 1}$$

Correct Answers:

- x+1
- x-1

9. (1 point) Enter "=" if the proposed identity holds, and "N" otherwise.

$$(a+b)^2 \underline{\hspace{1cm}} a^2 + b^2.$$

$$(a+b)^2 \underline{\hspace{1cm}} a^2 + 2ab + b^2.$$

$$(a-b)^2 \underline{\hspace{1cm}} a^2 - b^2.$$

$$(a-b)^2 \underline{\hspace{1cm}} a^2 - 2ab + b^2.$$

$$a^2 - b^2 \underline{\hspace{1cm}} (a-b)(a+b).$$

Correct Answers:

- N
- =

- N
- =
- =

10. (1 point) Perform the indicated operation, and simplify if possible. Assume any factors you cancel are not zero.

$$\frac{q + \frac{27}{q^2}}{1 + \frac{3}{q}} = \underline{\hspace{2cm}}$$

Correct Answers:

- $q^2 - 3q + 9$
- q

11. (1 point) Solve the system using substitution

$$\begin{cases} x - 4y = 0 \\ 6x - y^2 = 0 \end{cases}$$

There are two solutions $(x_1, y_1), (x_2, y_2)$ for $x_1 < x_2$.

$$x_1 = \underline{\hspace{1cm}}$$

$$y_1 = \underline{\hspace{1cm}}$$

$$x_2 = \underline{\hspace{1cm}}$$

$$y_2 = \underline{\hspace{1cm}}$$

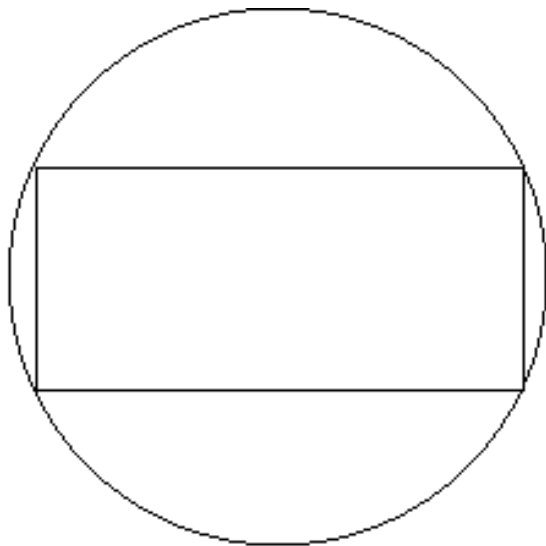
Correct Answers:

- 0
- 0
- 96
- 24

12. (1 point) A circular piece of sheet metal has a diameter of 20 in. The edges are to be cut off to form a rectangle of area 110 in² (see the figure below). What are the dimensions of the rectangle?

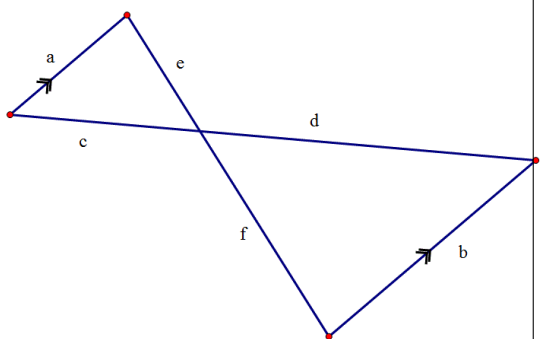
Its length is $\underline{\hspace{2cm}}$

Its width is $\underline{\hspace{2cm}}$



Correct Answers:

- 19.1581035304881
- 5.74169566548936



13. (1 point)

Two triangles are constructed between two parallel lines
Some of the sidelengths are $a = 3, b = 9, d = 15.6, f = 12.6$

What is the length of c ? ____ cm of e ? ____ cm

Correct Answers:

- 5.2
- 4.2

14. (1 point)

This exercise will help you review some basic trigonometry on a right triangle. Recall that, by the Pythagorean Theorem, a triangle with sides a, b and c has a right angle opposite the (longest) side c if and only if

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

This is certainly true for the triangle in this problem. If necessary, review the definitions of the trigonometric functions and their inverses to solve this problem.

Consider the familiar right triangle with sides of lengths 3, 4, and 5 feet. Let A be the angle opposite the side of length 3, and B the angle opposite the side of length 4 feet.

$A =$ ____ radians = ____ degrees, and

$B =$ ____ radians = ____ degrees.

Correct Answers:

- 0.643501108793284
- 36.869897645844
- 0.927295218001612
- 53.130102354156

15. (1 point)

Find the angle between 0 and 2π that is equivalent to $\frac{17\pi}{4}$.
 $\theta =$ ____

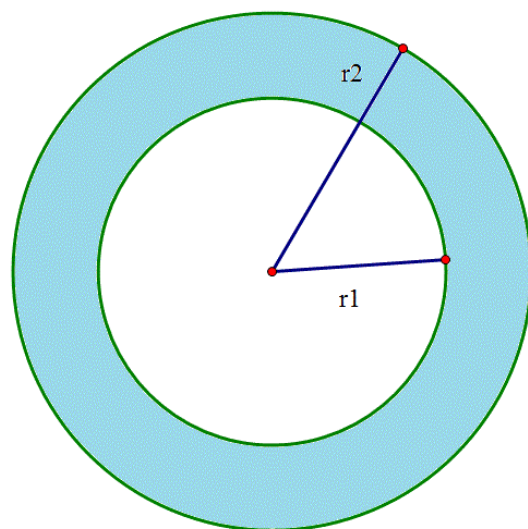
Solution:

Solution:

Because $\frac{17\pi}{4} > 2\pi$, we repeatedly subtract 2π until we arrive at a radian measure that is between 0 and 2π . Because $0 < \frac{1\pi}{4} < 2\pi$, $\frac{1\pi}{4}$ is the angle measure between 0 and 2π that is equivalent to $\frac{17\pi}{4}$.

Correct Answers:

- 0.785398



16. (1 point)

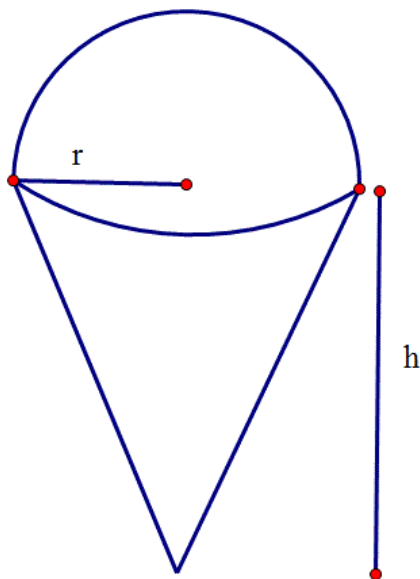
The radius of the small circle is = 1.5 cm.

The radius of the large circle is = 9.3 cm.

Find the value of the shaded annulus
Area is ____ cm^2 .

Correct Answers:

- 264.647765138404



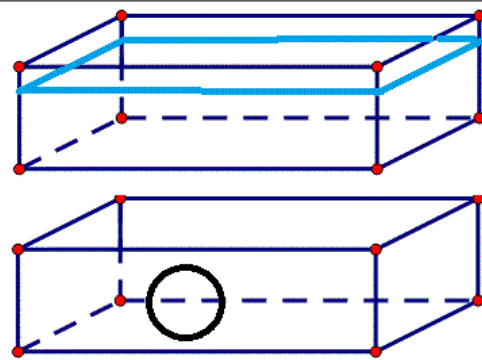
17. (1 point)

The icecream cone is full of icecream, and also has a hemisphere of icecream on top. The diameter of the cone is 6.4cm , and the height is 7cm .

What is the volume of icecream ? _____ cm^3

Correct Answers:

- 143.692259184992



18. (1 point)

The fish tank has side lengths 12in , 16in and height 18in . The water level is two inches below the top of the tank. A glass sphere of radius 2in is dropped in to the tank. What is the new distance from the water to the top of the tank? _____ in

How many of these balls can be put into the tank with the tank not overflowing? _____ spheres.

Correct Answers:

- 1.82546707480057
- 11

19. (1 point) What three-dimensional figure has one base and triangular sides?

- A. prism
- B. cone
- C. cylinder
- D. pyramid

Solution:

Solution

Cylinders and prisms have two bases. A cone does not have triangular sides..

Correct Answers:

- D