1. Find real numbers a, b, and c such that the graph of the function $f(x) = ax^2 + bx + c$ contains the points $(-6, -90)$, $(2, -2)$, and $(-1, -5)$, then use this to compute $f(1)$

   A $f(1) = 1$

   B $f(1) = 5$

   C $f(1) = -3$

   D $f(1) = 4$

   E $f(1) = 3$

   F none of these

2. Suppose

$$\begin{vmatrix} x & y & z \\ a & b & c \\ -4 & 4 & -3 \end{vmatrix} = 5$$

   Use the properties of determinants to find:

$$\begin{vmatrix} x & y & z \\ a & b & c \\ a-4 & b+4 & c-3 \end{vmatrix}$$

   A 114

   B not enough information given

   C -27

   D 50

   E -108

   F 5

   G none of these

3. Given

$$\left[\begin{array}{cccc} -8 & 0 & 2 & -1 \\ -1 & 1 & -4 & 0 \\ 0 & 0 & -1 & 0 \end{array}\right]$$

   Determine the associated linear system of equations , also determine the echelon row reduce matrix, and finally, determine the associated system of equations after row reduction.

   A
$$\begin{aligned} x + 7y &= 1 \\ 8y &= 1 \\ z &= 0 \end{aligned}$$

   B
$$\begin{aligned} -8x + 2z &= -1 \\ -x + y - 4z &= 0 \\ -z &= 0 \end{aligned}$$

   C
$$\begin{aligned} x - 2y + 3z &= 1 \\ -x - y + z &= 0 \\ -x - y - z &= -1 \end{aligned}$$

   D
$$\begin{aligned} -5x + y - z &= 0 \\ -2x - y &= 0 \\ x + y &= -1 \end{aligned}$$

   E
$$\left[\begin{array}{cccc} 1 & 7 & 0 & 1 \\ 0 & 8 & 0 & 1 \\ 0 & 0 & 1 & 0 \end{array}\right]$$

   F
$$\left[\begin{array}{cccc} 1 & 0 & 1 & -3 \\ 0 & 1 & 3 & -4 \\ 0 & 0 & 4 & -6 \end{array}\right]$$

   G
$$\begin{aligned} -x + 2y + z &= 1 \\ -y + z &= -2 \\ 3y + z &= 0 \end{aligned}$$

   H none of these

4.

There are 1590 light bulbs lined up in a row in a long room. Each bulb has its own switch and is currently switched off. The room has an entry door and an exit door. There are 1590 people lined up outside the entry door. Each bulb is numbered consecutively from 1 to 1590. So is each person.

Person No. 1 enters the room, switches on every bulb, and exits. Person No. 2 enters and flips the switch on every second bulb (turning off bulbs 2, 4, 6...). Person No. 3 enters and flips the switch on every third bulb (changing the state on bulbs 3, 6, 9...). This continues until all 1590 people have passed through the room. How many of the light bulbs are illuminated after the 1590th person has passed through the room?

A 37

B 42

C 33

D 44

E 38

F 40

G 39

H none of these

---

5. Suppose $a-7=b-7=c+5=d-3=a+b+c+d-2$

Find the value of $a+b+c+d$

A $-\frac{7}{3}$

B $-\frac{17}{3}$

C $-\frac{4}{3}$

D $-\frac{22}{3}$

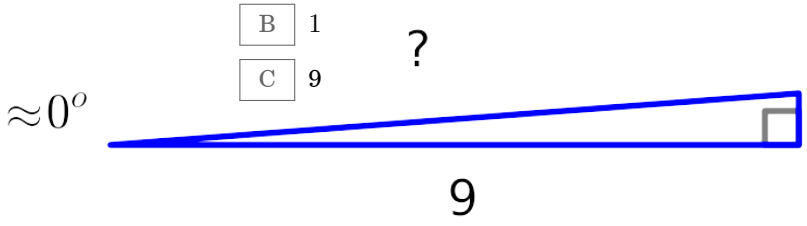
E $\frac{7}{3}$

F none of these

A ≈ 0

B 1

C 9



6. determine the length of indicated side

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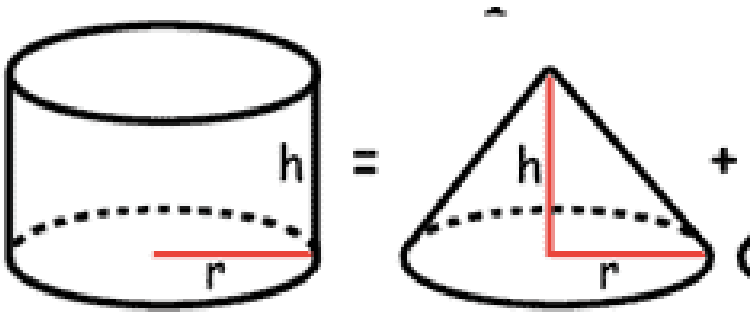
7. Which is greater the volume of one upright cylinder or the volume of 3 cones, all have same height and radius?



A they have the same volume

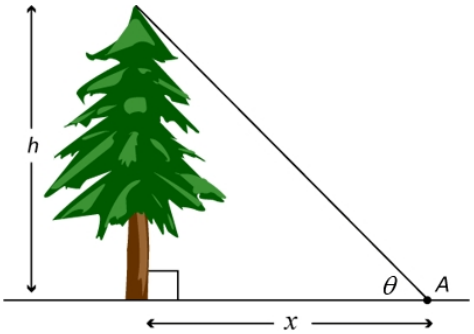
B not enough information is given to resolve the problem

C the three cones have more volume

D none of these

---

8. Suppose you look at a tree from afar and note the angle of elevation is 45^o. From that point, after walking 23 feet away from the tree, you note the angle of elevation decreased to 30^o. Estimate how far away from the tree you were [x on diagram below], before you moved 23 feet away. [do not use ideas from future part of the course].



A 31.419 ft

B cB5c ft

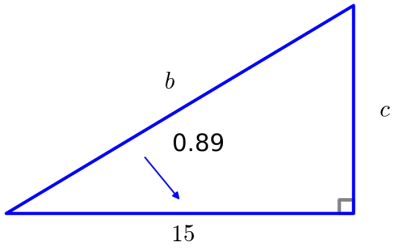
C 37.395 ft

D 58.597 ft

E none of these

---

9. consider the sides and ratio given below:

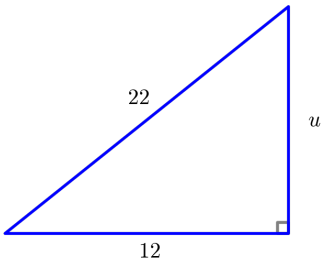


A $b \div 0.89 = 15$

B $15 \times 0.89 = b$

C $15 \div 0.89 = b$

10.



A $u = \pm\sqrt{22^2 - 12^2}$

B $22^2 = u^2 + 12^2$

C $u = \pm 22 \pm 12^2$

D $u = \pm\sqrt{12^2 + 22^2}$

---

11. How many one-radian angles could fit in a quarter of a circle?

A $\frac{\pi}{4}$

B $\frac{\pi}{3}$

C $\frac{\pi}{6}$

D π

E none of these

---

12. 90° is equivalent to

A 360°

B $\frac{3\pi}{2}$

C $\frac{\pi}{2}$

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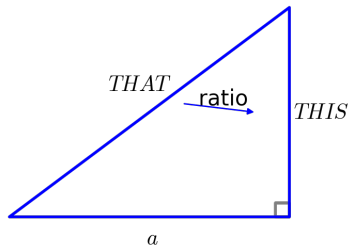
13. consider the sides and ratio given below:



A $THAT \times THIS = ratio$

B $THAT \times ratio = THIS$

C $THIS \div ratio = THAT$

D $THAT + ratio = THIS$

E $THAT \div ratio = THIS$

F none of these

---

14. Among the tallest buildings in the world is the Burj Khalifa in Dubai, rising 2,722 ft from the ground. Assume the earth is perfectly round with radius 3989 mi, approximate how far onto the horizon one can see directly from the very top of the building. [hint: pythagoras]

A 67.341 mi

B 64.134 mi

C 76.961 mi

D 62.21 mi

E none of these

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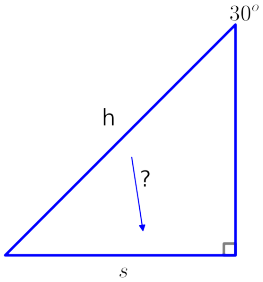
15. Identify the ratio



A 2

B 50%

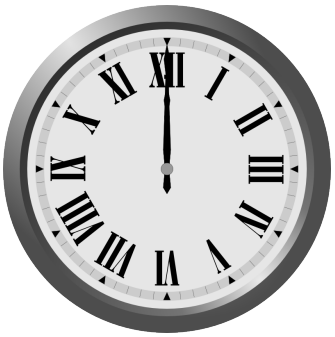
C $\frac{1}{\sqrt{3}}$

16. The Pythagorean Theorem

A helps check if a triangle is a right triangle

B helps check if a triangle is an isosceles triangle

17. At 12:00 o'clock the minute and the hour hand point exactly in the same direction. As time goes on after this when is the next time that the two hands meet again?



A they will meet again at exactly at 3:15

B they will meet again at exactly at 1:05

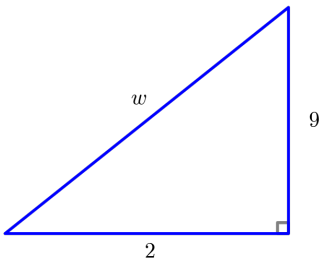
C they will meet again at exactly at 1:06

D they will meet again at exactly at 2:10

E they will meet again at exactly at 1:05:30

F none of these

18.



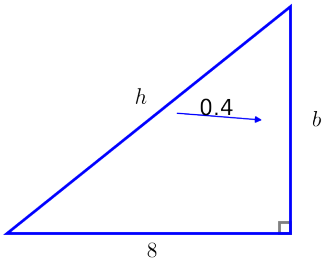
A $w^2 = 9^2 + 2^2$

B $w = \pm\sqrt{9^2} \pm \sqrt{2^2}$

C $w^2 = 9^2 - 2^2$

D $w = \pm\sqrt{9^2 + 2^2}$

19. consider the sides and ratio given below:



A not enough information

B $h \approx 8.467$

C $b \approx 18.33$

D $b \approx 3.492$

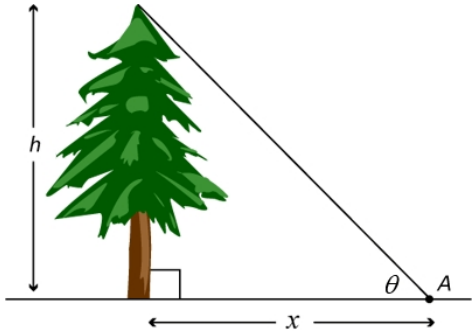
E $h \approx 8.729$

F $h \approx 20$

G $b \approx 3.736$

H none of these

20. Suppose you look at a tree from afar and note the angle of elevation is 45^o. From that point, after walking 17 feet away from the tree, you note the angle of elevation decreased to 30^o. Estimate the height of the tree [h on diagram below, and do not use ideas from future part of the course].



A 55.446 ft

B 21.517 ft

C 23.222 ft

D 27.640 ft

1) A, 2) F, 3) ABE, 4) G, 5) C, 6) C, 7) A, 8) A, 9) C, 10) AB, 11) E, 12) C, 13) BC, 14) B, 15) B, 16) A, 17) F, 18) AD, 19) DE, 20) C