

32 and 31 - Great job!

Extras! Basic problem \rightarrow nCr explanation

2-5-22 2018 December 305

NAEP

Learn: Ellipse graph characteristics from equation
- Watch Khan Academy videos

48) $2\pi + \theta =$

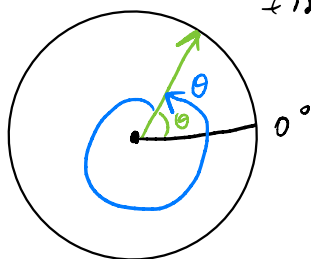
$\underset{360^\circ}{11}$

$\theta + 360^\circ = \theta$
 $+ 720^\circ = \theta$

$\theta + 360^\circ k = \theta$

where $k \in \mathbb{Z}$

"is an integer"



mean angle measure

$\sin(2\pi + \theta) = \sin(\theta)$

dimensional analysis

conversion factor

$\frac{\pi}{180^\circ}$

$\frac{2\pi}{360^\circ}$

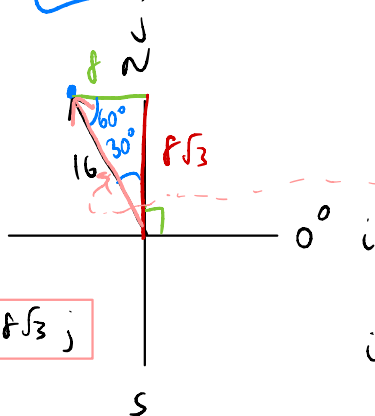
$\frac{\pi}{2} \times \frac{180^\circ}{\pi} = 90^\circ$

$\frac{\pi}{4} \times \frac{180^\circ}{\pi} = 45^\circ$

$60^\circ \times \frac{\pi}{180^\circ} = \frac{\pi}{3}$

$30^\circ \times \frac{\pi}{180^\circ} = \frac{\pi}{6}$

Trig 51)



$-8i + 8\sqrt{3}j$

$i = \begin{pmatrix} 1 \\ 0 \end{pmatrix}_x \begin{pmatrix} 0 \\ 1 \end{pmatrix}_y$

$j = \begin{pmatrix} 0 \\ 1 \end{pmatrix}_x \begin{pmatrix} 1 \\ 0 \end{pmatrix}_y$

\rightarrow

\uparrow

$-8 \cdot i + 8\sqrt{3} \cdot j$

$30 - 60 - 90$

$8 \quad 8\sqrt{3} \quad 16$

$1 : \sqrt{3} : 2$

$-8 \begin{pmatrix} 1 \\ 0 \end{pmatrix} + 8\sqrt{3} \begin{pmatrix} 0 \\ 1 \end{pmatrix} = \begin{pmatrix} -8 \\ 0 \end{pmatrix} + \begin{pmatrix} 0 \\ 8\sqrt{3} \end{pmatrix} = \begin{pmatrix} -8 \\ 8\sqrt{3} \end{pmatrix}$

$$f = x+1 \quad g = \sqrt{x}$$

$$\neq ((f \circ g)(x) = \sqrt{x}(x+1) \quad (f \circ g)(x) = f(g(x)) = \sqrt{x+1})$$

Composition of functions

$$57) \quad f(x) = \sqrt[3]{x} - 2 \quad g(x) = x+1$$

$$(f \circ g)(x) = f(g(x)) = \sqrt[3]{x+1} - 2$$

$$(g \circ f)(x) = g(f(x)) = \sqrt[3]{x} - 2 + 1 = \sqrt[3]{x} - 1$$

58)

How many ways to group



nCr on calculator

$$nP_r = \frac{n!}{(n-r)!}$$

$$nC_r = \binom{n}{r} = \frac{n!}{r!(n-r)!}$$

order unimportant

"divide out by order"

$$\frac{2 \text{ lines}}{6 \text{ lines}} = \frac{1}{3}$$

59)

$$c^2 = a^2 + b^2 - 2ab \cos C$$

$$x^2 = a^2 + b^2 - 2ab \cos C$$

If solving for x, we don't know what C, the opposite angle is \Rightarrow impossible

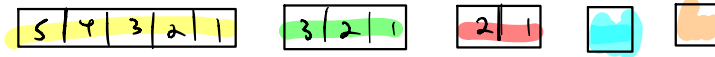
Analyze equation after class

$$10^2 = x^2 + 14^2 - 2(14)x \cos(34^\circ)$$

12 books, 5 math, 3 sci-fi, 2 comic books, 1 environment, 1 miscellaneous topic.

All books of same topic must be together.

(How many arrangements?)



How many ways to order big groups? $5! = 5 \cdot 4 \cdot 3 \cdot 2 \cdot 1 = 120$

5 choices for 1st grp, 4 for second, 3 for third ...

$$5! \cdot 4! \cdot 3! \cdot 2! \cdot 1!$$

30) Put in calculator \rightarrow done

1 2 3 4 5 6 0 0 0 0 0 0 0 0 0

shifter

$$1.23456 \times 10^{14}$$

$$3.8 \times 10^5 + 0.64 \times 10^5$$

$$32) \quad 350 \text{ mi} \times \frac{4.44 \times 10^5 \text{ gal}}{32 \text{ mi}} \times \frac{\$4}{\text{gal}} = \$43.75$$

conversion factors

$$\frac{32 \text{ mi}}{\text{gal}}$$

$$\frac{\$4}{\text{gal}}$$

S7)

$$x \cdot \underbrace{1.2 \cdot 1.3 \cdot 0.8}_{= 1.25} = 1.25 \cdot c$$

How 4b)
to solve
system of
eqs. in
calc

$$\begin{aligned} b + c &= 2700 \\ 0.18b + 0.15c &= 441 \end{aligned}$$

$$\left(\begin{array}{cc|c} 1 & 1 & 2700 \\ 0.18 & 0.15 & 441 \end{array} \right)$$

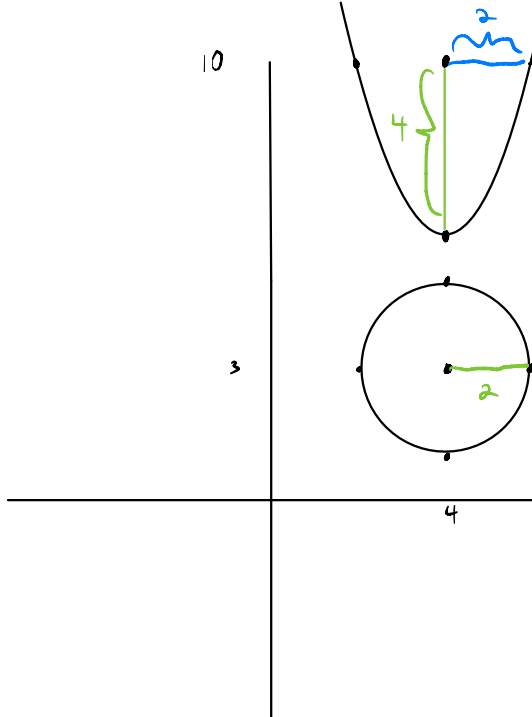
2×3
augmented
matrix

reduced row echelon form ref

$$b = 1200$$

$$c = 1500$$

60)



$$\frac{(x-4)^2}{4} + \frac{(y-10)^2}{16} = 1$$

$$= \frac{(x-4)^2}{2^2} + \frac{(y-10)^2}{4^2} = 1$$

minor axis major axis

$$(x-4)^2 + (y-3)^2 = 4 = 2^2$$

Want:

$$\begin{pmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{pmatrix}$$

Note: for this ellipse, the **minor** axis is parallel to the x-axis because the smaller denominator is under x.

conversely, the **major** axis is parallel to the y-axis because the larger denominator is under y.

This could be reversed.

Application
of matrix

ref algorithm:

$$x + 2y + 3z = 4$$

$$3x + 4y + z = 5$$

$$2x + y + 3z = 6$$

$$\begin{pmatrix} 1 & 2 & 3 & 4 \\ 3 & 4 & 1 & 5 \\ 2 & 1 & 3 & 6 \end{pmatrix} \xrightarrow{r_2 - 3r_1, r_3 - 2r_1} \begin{pmatrix} 1 & 2 & 3 & 4 \\ 0 & -2 & -8 & -7 \\ 2 & 1 & 3 & 6 \end{pmatrix} \xrightarrow{r_3 - 2r_1} \begin{pmatrix} 1 & 2 & 3 & 4 \\ 0 & -2 & -8 & -7 \\ 0 & -3 & -3 & -2 \end{pmatrix}$$

$$r_2 \cdot (-\frac{1}{2})$$

$$\begin{pmatrix} 1 & 2 & 3 & 4 \\ 0 & 1 & 4 & 7/2 \\ 0 & -3 & -3 & -2 \end{pmatrix} \xrightarrow{r_3 + 3r_2} \begin{pmatrix} 1 & 2 & 3 & 4 \\ 0 & 1 & 4 & 7/2 \\ 0 & 0 & 9 & 17/2 \end{pmatrix} \xrightarrow{r_3 \cdot (1/9)} \begin{pmatrix} 1 & 2 & 3 & 4 \\ 0 & 1 & 4 & 7/2 \\ 0 & 0 & 1 & 17/18 \end{pmatrix}$$

To get last 3 zeros, $r_2 - 4r_3$; $r_1 - 3r_3$; $r_1 - 2r_2$. Done.