1. Only one solution when | x -3 | = 0

   X = 3

   $\frac{1}{2}|x - 3| + 4 = 3k$

   So, 0 + 4 = 3k

   K = 4/3

2. Let $f(x)=a^x - b$

   The function passes through the points (c,4) and (2c,60)

   What is a possible value of b?

   $4 = a^c - b$

   $60 = a^{2c} - b$

   Subtract

   $56 = a^{2c} - a^c$

   Let $a^c = x$

   $56 = x^2 - x$

   $x^2 - x - 56 = 0$

   $x^2 - 8x + 7x - 56 = 0$

   x(x-8) + 7 (x-8) = 0

   x = 8 and x = -7

   So. $a^c = 8$

   4 = 8 - b, so b = 4

3. $\frac{1}{k} - \frac{x}{60} = \frac{6}{kx}$

   $\frac{60-kx}{60k} = \frac{6}{kx}$

   $60kx - k^2x^2 = 360k$

   $K^2x^2 - 60kx + 360k = 0$

   For a quadratic equation with more than one real solution, $b^2 - 4ac > 0$

   $a=k^2$, b = -60k and c=360k

   $(60k)^2 - 4(k^2)(360k) > 0$

   $3600k^2 - 1440k^3 > 0$, Divide by k^2

   3600 > 1440k

   K = 3600/1440 = 2.5, so 2.5 > k and k < 2.5, greatest integer would be 2

4. $4x^2+4y^2+cx+cy=132$

$x^2+y^2+\frac{c}{4}x+\frac{c}{4}y = 33$

$(x+\frac{c}{8})^2 + (y+\frac{c}{8})^2 = 33 + \frac{c^2}{64} + \frac{c^2}{64}$

$(x-h)^2 + (y-k)^2 = r^2$

$r = 7$

$49 = 33 + \frac{c^2}{64} + \frac{c^2}{64}$

$16 = \frac{c^2}{32}$

$c = 16\sqrt{2}$

5. cosX=sinY

   $\cos\theta=\sin(90^\circ-\theta)$

   So:

   $\cos X=\sin Y \Rightarrow X+Y=90^\circ$

   $(10x+7)+(83-x)=90$

   $9x+90 = 90$ so, $x = 0$

   $X = 7$
   $Y = 83$

6. $\frac{4x+8}{2} - \frac{c}{4} = d(x-1)$

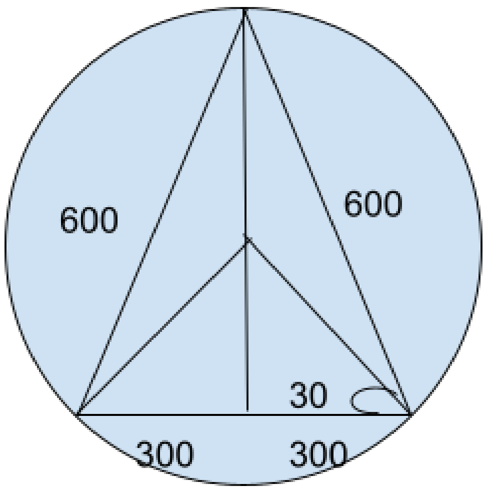
$\frac{8x+16-c}{4} = dx - d$

$8x+16-c = 4dx-4d$

For the equation to have **infinitely many solutions**, both sides must be **identical expressions. So the coefficients of xxx must match and the constants must match:**
8 = 4d and so d = 2
16-c = -4d = -8 and 24 = c

7. The radius of the circle is k$\sqrt{3}$ inches

Perimeter = 600inches, so each side = 200 inches



30-60-90 triangle

x$\sqrt{3}$ = 300

x = 100$\sqrt{3}$

Radius = 2x = 200$\sqrt{3}$ = k$\sqrt{3}$

So, k = 200/3

8. $\frac{m}{f}$ = $\frac{1}{5}$

Total = 480 horses

Male = $\frac{1}{6}$.480 = 80 horses total and female = 400 horses

In that 400 horses, $\frac{x}{y}$ =$\frac{3}{5}$

Ranch X female = $\frac{3}{8}$ * 400 =150

Ranch Y female = 250

180 horses - Ranch X - Female = 150 and Male = 30

300 horses - Ranch Y - Female = 250 and Male = 50

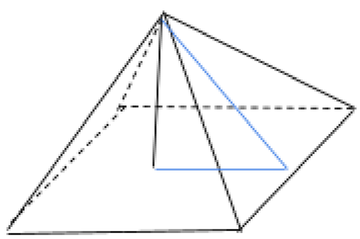
Ranch Y has 20 more male horses than Ranch X.

9.

As it has a square base, l and w are equal

V = $\frac{1}{3}lwh = \frac{1}{3}l^2 h$ = 400

l^2 h = 400*3 = 1200



$h^2+(\frac{l}{2})^2 = 13^2$

$h^2+(\frac{l^2}{4}) = 169$

$4h^2 + l^2 = 169$

Using desmos to solve 2 equations above - h is 10 and l is 12