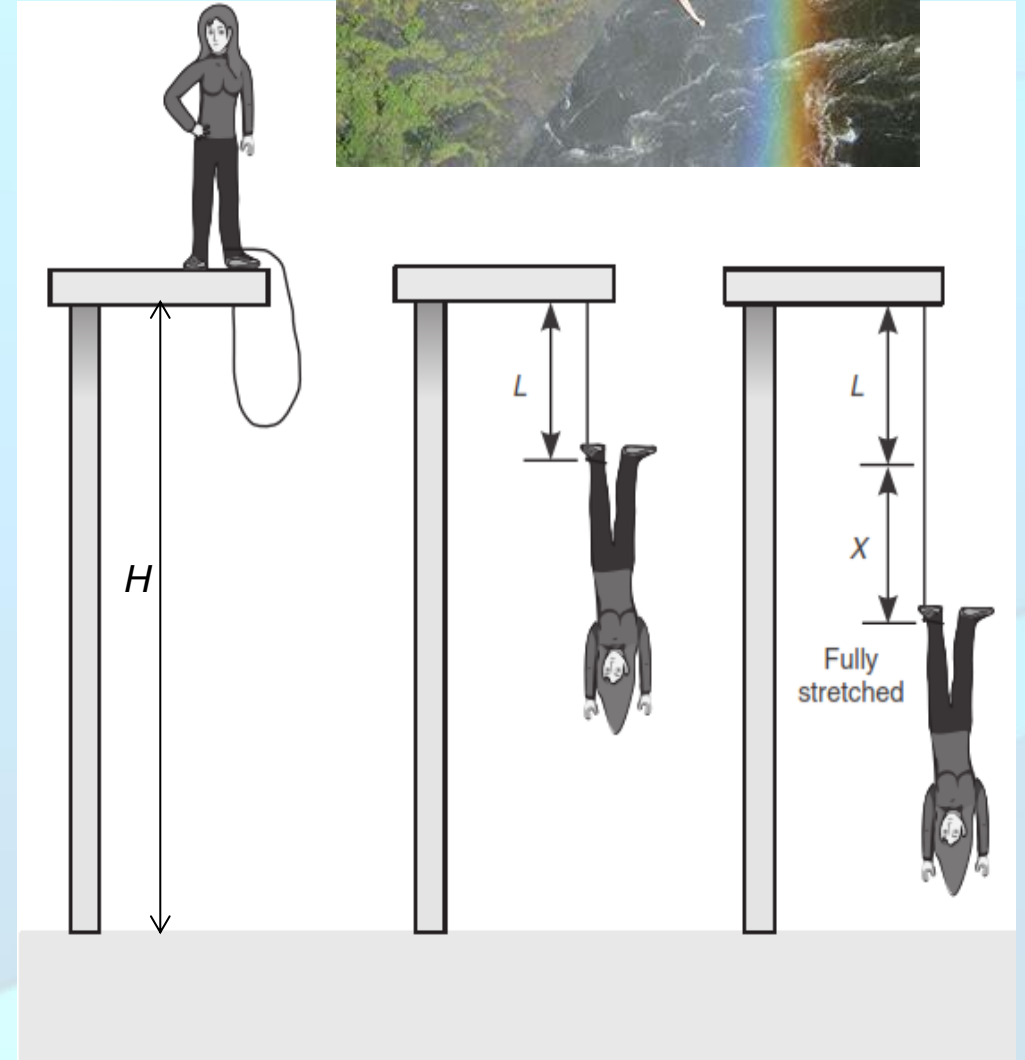


Bungee Jumping Design.(Kosky)

As displayed in the figure. At full stretch, the elastic rope of original length L stretches to $L + X$. For a person whose weight is W [N] and a cord with a stiffness K [N/m], the extension X [m] is given by the following formula:

$$X = \frac{W}{K} + \sqrt{\frac{W^2}{K^2} + \frac{2WL}{K}}$$

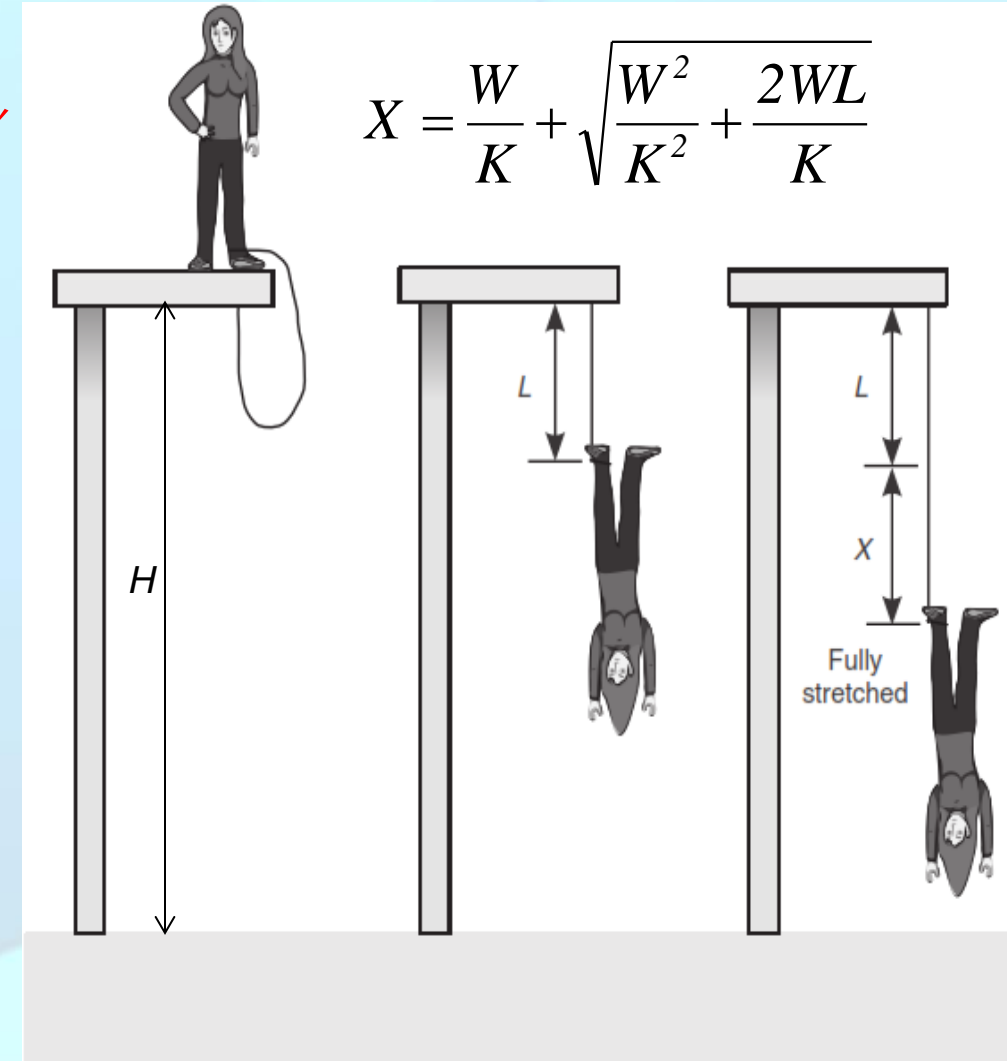
1. If the height of the tower H is 50 m, $K = 100$ N/m, $L = 15$ m, and the person's weight W is 700 N, will the person be able to bungee jump safely? Support your answer by giving the final value for $L + X$.
2. What's the jumper's weight limit?



3. If the height of the tower is 60 m, and the weight of the person is 800 N, and the unstretched length $L = 20$ m, find a value of K that enables this person to stop exactly 2 m above the ground.

4. Determine the height of the tower H , if $K = 80$ N/m, $L = 22$ m, and the person's weight W is 1000 N, and if the person must stop exactly 3m above the ground

5. Determine L the length of the rope, if $K = 80$ N/m, $H = 64$ m, and the person's weight W is 1000 N, and if the person must stop exactly 3m above the ground.



Solving simultaneous equations

- solve simultaneous equations in two unknowns by substitution
- solve simultaneous equations in two unknowns by elimination

Problem 1. Solve the following equations for x and y ,

(a) by substitution and

(b) (b) by elimination

$$x + 2y = -1 \quad (1)$$

$$4x - 3y = 18 \quad (2)$$

Problem 2. Solve, by a substitution method, the simultaneous equations

$$3x - 2y = 12 \quad (1)$$

$$x + 3y = -7 \quad (2)$$

Problem 3. Use an elimination method to solve the following simultaneous equations

$$3x + 4y = 5 \quad (1)$$

$$2x - 5y = -12 \quad (2)$$

Calculator Practice revision

Use your calculator to

1. Evaluate $\cos 63.74^\circ$ correct to 4 decimal places
2. Evaluate $\tan 39.55^\circ - \sin 52.53^\circ$ correct to 3 decimal places
3. Evaluate $\sin(0.437 \text{ rad})$ correct to 4 decimal places
4. Evaluate $\frac{\sin 67^\circ - \sin 43^\circ}{\sin 10^\circ}$ correct to 3 decimal places

Use your calculator to

1. Evaluate $2.7(\pi - 1)$ correct to 3 significant figures
2. Evaluate $\pi^2(\sqrt{13} - 1)$ correct to 4 significant figures
3. Evaluate $3e^{(2\pi-1)}$ correct to 3 significant figures
4. Evaluate $\sqrt{\left[\frac{5.52\pi}{2e^{-2} \times \sqrt{26.73}}\right]}$ correct to 4 significant figures

A man wants to purchase the largest fenced-in square ranch he can afford. He has 320,000,000 SP available for the purchase. Fencing costs 10×10^6 SP a kilometer, and land costs 100×10^6 SP a square kilometer.

How large a ranch, as measured by the length of one side of the square, can he buy?

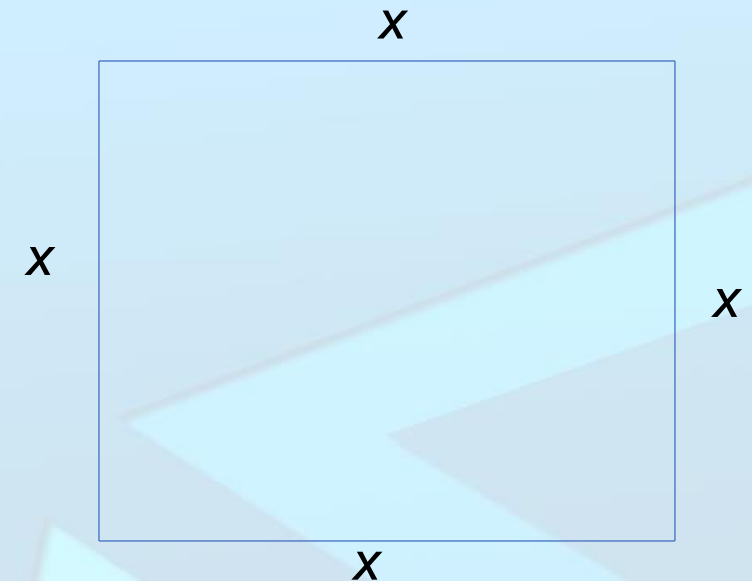
Need: The length of a side of the largest square of land the man can buy.

Knowns: Fencing costs 10×10^6 SP a kilometer, and land costs 100×10^6 SP square kilometer.

The man has 320,000,000 SP to invest.

How?: Let the unknown length = X kilometers. It may not be immediately obvious how to write an equation to find X . Now sketch the ranch.

Solve:



مسألة تقديرات: كم محل للحلاقة الرجالية تحتاج مدينة عدد سكانها 60,000 نسمة؟ سجل فرضياتك المبررة لنتائجك.

Write the two following equations in a suitable form to be solved using your calculator

- | | |
|---|--------------------------------------|
| 1. $7p + 11 + 2q = 0$ | 2. $\frac{x}{2} + \frac{y}{3} = 4$ |
| $-1 = 3q - 5p$ | $\frac{x}{6} - \frac{y}{9} = 0$ |
| 3. $\frac{a}{2} - 7 = -2b$ | 4. $\frac{3}{2}s - 2t = 8$ |
| $12 = 5a + \frac{2}{3}b$ | $\frac{s}{4} + 3t = -2$ |
| 5. $\frac{x}{5} + \frac{2y}{3} = \frac{49}{15}$ | 6. $v - 1 = \frac{u}{12}$ |
| $\frac{3x}{7} - \frac{y}{2} + \frac{5}{7} = 0$ | $u + \frac{v}{4} - \frac{25}{2} = 0$ |
| 7. $1.5x - 2.2y = -18$ | 8. $3b - 2.5a = 0.45$ |
| $2.4x + 0.6y = 33$ | $1.6a + 0.8b = 0.8$ |

Write the following equations in a form suitable to be solved using your calculator

1. $\frac{3}{x} + \frac{2}{y} = 14$

2. $\frac{4}{a} - \frac{3}{b} = 18$

$\frac{5}{x} - \frac{3}{y} = -2$

$\frac{2}{a} + \frac{5}{b} = -4$

3. $\frac{1}{2p} + \frac{3}{5q} = 5$

4. $\frac{5}{x} + \frac{3}{y} = 1.1$

$\frac{5}{p} - \frac{1}{2q} = \frac{35}{2}$

$\frac{3}{x} - \frac{7}{y} = -1.1$

5. $\frac{c+1}{4} - \frac{d+2}{3} + 1 = 0$

$\frac{1-c}{5} + \frac{3-d}{4} + \frac{13}{20} = 0$

6. $\frac{3r+2}{5} - \frac{2s-1}{4} = \frac{11}{5}$

7. $\frac{5}{x+y} = \frac{20}{27}$

$\frac{3+2r}{4} + \frac{5-s}{3} = \frac{15}{4}$

$\frac{4}{2x-y} = \frac{16}{33}$

8. If $5x - \frac{3}{y} = 1$ and $x + \frac{4}{y} = \frac{5}{2}$, find the value of $\frac{xy+1}{y}$