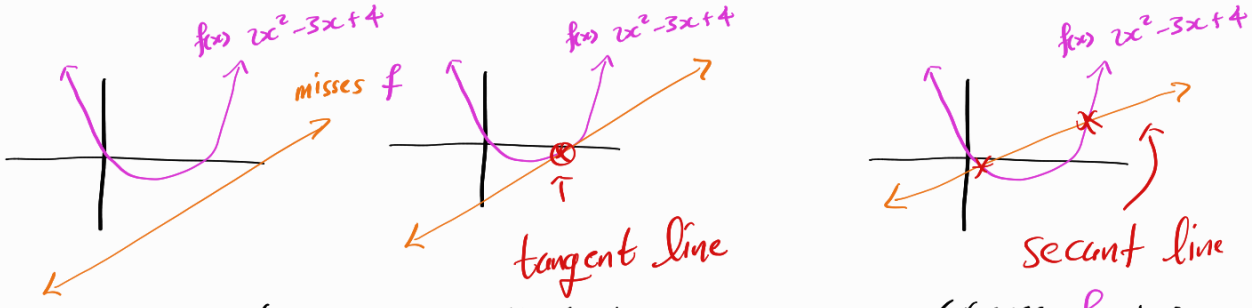
Happy Halloween



no intersection — exactly touches once — crosses f twice

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

$y = 2x + b$

if $y = 2x + b$ is tangent to $f(x)$ find the value of b.

① set the two equal to each other

$$2x^2 - 3x + 4 = 2x + b$$

② move everything to one side

$$2x^2 - 5x + (4 - b) = 0$$

a new quadratic!

this is c

③ set discriminant = 0 ← forces only one intersection

$$b^2 - 4ac = 0$$

$$25 - 4(2)(4 - b) = 0$$

$$25 - 8(4 - b) = 0$$

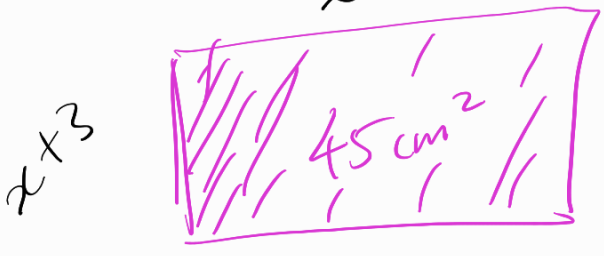
$$25 - 32 + 8b = 0$$

$-7 + 8b = 0 \rightsquigarrow b = 7/8$

Word Problems

- A rectangle has length 3 cm longer than its width, total area is $45\,cm^2$.

Find width of rectangle.



STEP 1

Translate the English into maths (use variables)

$\therefore x(x+3) = 45\ cm^2$

x = width, $x+3$ = length

STEP 2 Solve equation algebraically

$x(x+3) = 45 \rightsquigarrow x^2 + 3x - 45 = 0$

$$x = \frac{-3 \pm \sqrt{9 - 4(-45)}}{2}$$

$$-3 + \sqrt{189}$$

$= \frac{\quad}{2}$

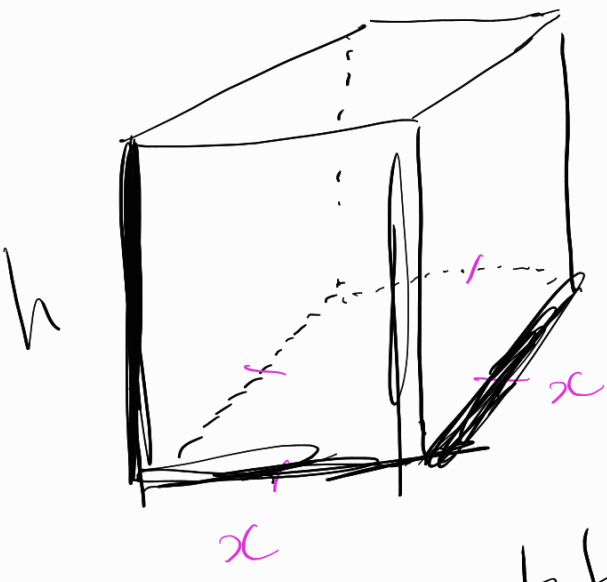
STEP 3

make sure answers make sense in context

$x = \frac{-3-\sqrt{189}}{2}$ ← something negative!

cannot have negative width!!

$x = \frac{-3+\sqrt{189}}{2}$ ← width.



- height is 1cm longer than base length
- total surface area is $240cm^2$.

what is x?

Find formula for Surface area.

SA = FRONT + BACK + LEFT + Right + Top + Bottom

$= (x+1)x + (x+1)x + (x+1)x + (x+1)x + x^2 + x^2$

$= 2x^2 + 4x(x+1)$

$= 2x^2 + 4x^2 + 4x = 240$

$6x^2 + 4x - 240 = 0$

$2(3x^2 + 2x - 120) = 0$

$x = \frac{-2 \pm \sqrt{4 - 4(3)(-120)}}{}$

$$= \frac{-2 \pm \sqrt{4 + 1440}}{6} = \frac{-2 \pm \sqrt{1444}}{6}$$

38

$$x = \frac{-2 \pm 38}{6} \Rightarrow x = \frac{-40}{6}, \frac{36}{6}$$

6

NONSENSE

$$x = 6$$

- Product of 2 consecutive odds is 255. What are the 2 #'s?

$$x(x+2) = 255$$

↳ solve for x....

Test next week!!