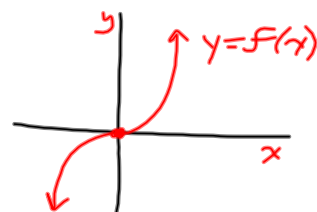Q14b) Better answer:

$h'(2) = -1.6$ means, 2 s. after the ball was kicked, the velocity of the ball at that instant was 1.6 m/s [down].

Q16) $f(x) = x|x|$

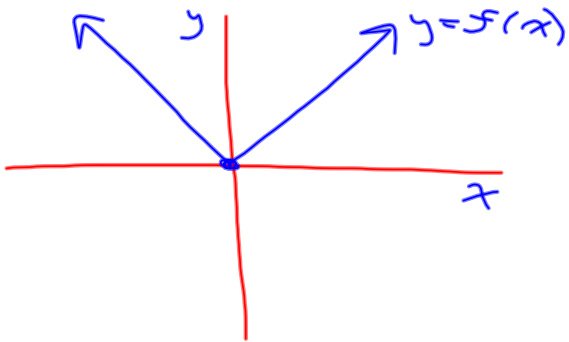$$= \begin{cases} -x^2 & \text{if } x < 0 \\ x^2 & \text{if } x \geq 0 \end{cases}$$

Well $f'(0) = \lim_{h \to 0} \dfrac{f(0+h) - f(0)}{h}$

$= \lim_{h \to 0} \dfrac{h|h| - 0}{h}$

$= \lim_{h \to 0} |h|$

$= 0$

Note:

$\lim_{h \to 0^-} |h| = \lim_{h \to 0} (-h)$ and $\lim_{h \to 0^+} |h| = \lim_{h \to 0} h$

$= 0$ $= 0$

Also Note:

If $f(x) = |x|$,   THEN

$y = f(x)$

- $\lim\limits_{x \to 0} f(x) = 0$

- $f'(0)$ does NOT exist

i.e. $\lim\limits_{h \to 0} \dfrac{|h|}{h}$ does NOT exist.

(Q17)   Since $f(a) = 0$ and $f'(a) = 6$

Then,

$$\lim\limits_{h \to 0} \frac{f(a+h)}{2h} = \frac{1}{2} \lim\limits_{h \to 0} \frac{f(a+h) - f(a)}{h}$$

$$= \frac{1}{2} f'(a)$$

$$= \frac{1}{2}(6)$$

$$= 3$$