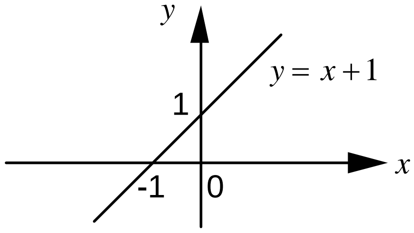
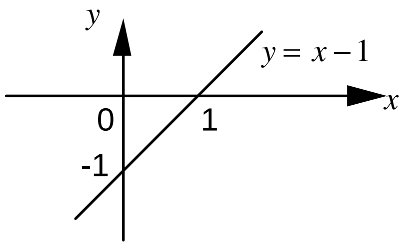
Complete solutions to Exercise 2(a)

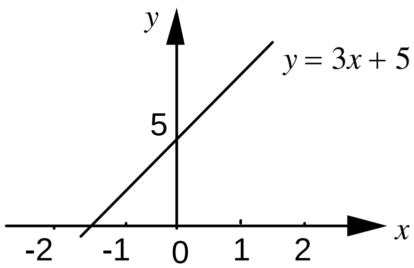
1. (a) With $y = mx + c$ we have $m = 1,\ c = 1$ for $y = x + 1$. The graph crosses the *y* axis at 1:



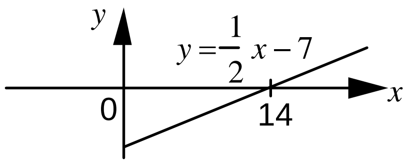
(b) Similarly $m = 1,\ c = -1$. Since $c = -1$ the graph crosses the *y* axis at -1.



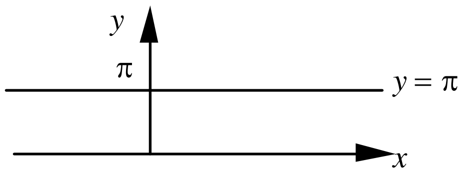
(c) The graph $y = 3x + 5$ crosses the *y* axis at 5 and has a gradient of 3 which means that for every unit horizontal there are 3 units vertical.



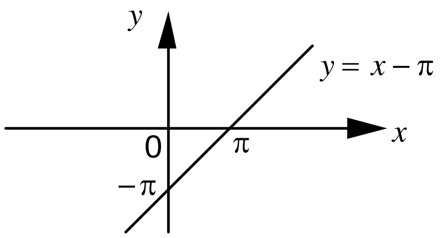
(d) The graph $y = \frac{1}{2}x - 7$ crosses the *y* axis at -7 and has a gradient of $\frac{1}{2}$.



(e) Transposing gives $y = \pi$ the gradient, *m* , is zero and the *y*-intercept is *p*. Since the gradient is zero there is no slope, just a horizontal line.



(f) Transposing gives $y = x - \pi$, the gradient of 1 and *y*-intercept of -*p*.



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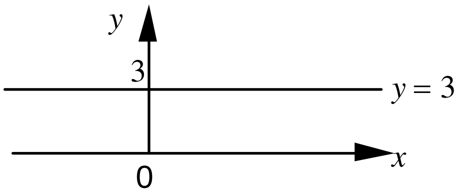
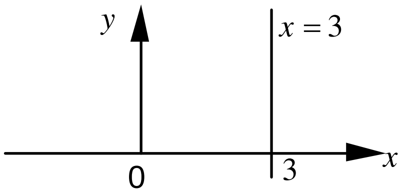
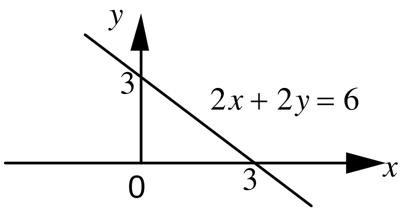
2.(a) The gradient of $y = 3$ is zero, the line $y = 3$ has no slope, and the y-intercept is 3. (a)



(b) $x = 3$ is a line parallel to the *y*-axis:



(c) From $2x + 2y = 6$ we have $2y = 6 - 2x$. Dividing by 2 gives $y = 3 - x$. The y-intercept is 3 and the gradient is -1. Since the gradient is a negative number the line slopes downwards to the right.

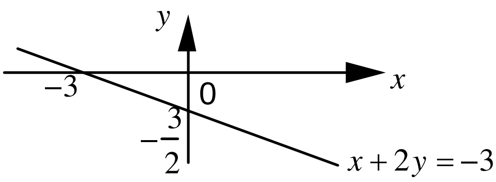


(d) $x + 2y = -3$ can be rewritten as

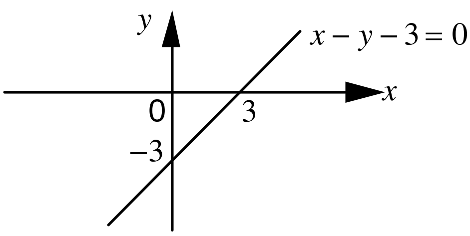
$$2y = -3 - x$$

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

We have gradient=$-\frac{1}{2}$ and y-intercept=$-\frac{3}{2}$, thus:



(e) $x - y - 3 = 0$ can be rewritten as $y = x - 3$. Gradient, $m = 1$ and y-intercept, $c = -3$.

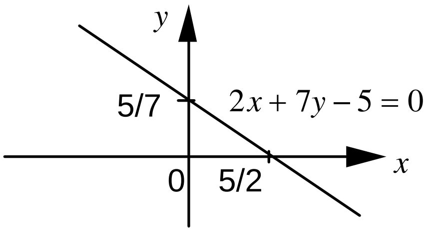


(f) $2x + 7y - 5 = 0$ can be rewritten as:

$$7y = 5 - 2x$$

$$y = \frac{5 - 2x}{7} = \frac{5}{7} - \frac{2}{7}x$$

The gradient is $-\frac{2}{7}$ and y-intercept is $\frac{5}{7}$:



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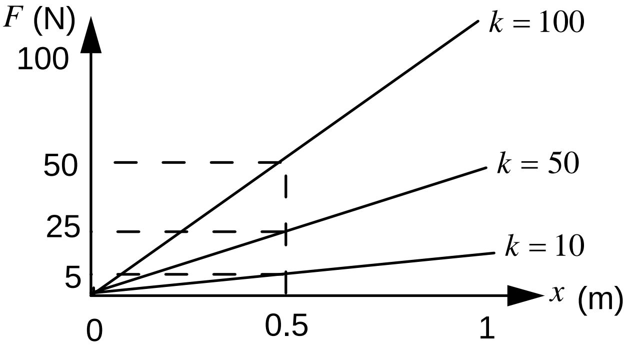
3. Putting $k = 10$, 50 and 100 gives us the equations $F = 10x$, $F = 50x$ and $F = 100x$ respectively. The graphs of these equations are straight lines going through the origin, (0,0), with gradients 10, 50 and 100 respectively.



For larger k you need more force for the same extension. For example for $x = 0.5$m you need a force of $5N, 25N$ and $50N$ for $k = 10$, 50 and $k = 100$ respectively.

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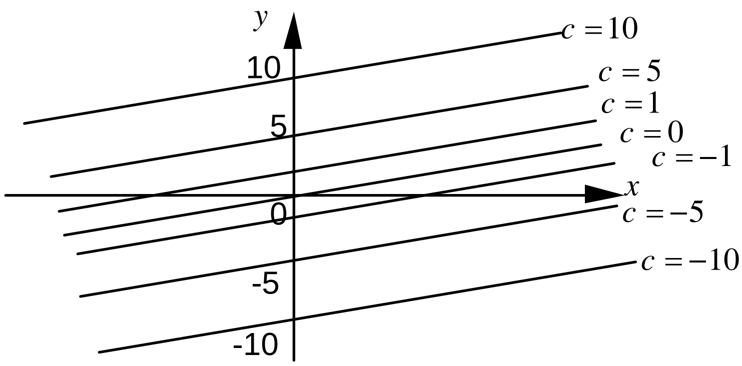
4. Substituting the given c values into $y = 3x + c$ gives us the equations $y = 3x$, $y = 3x + 1$, $y = 3x + 5$, $y = 3x + 10$, $y = 3x - 1$, $y = 3x - 5$ and $y = 3x - 10$.



5. For $0 \le t < 1$, the graph, $v = 2t$, is a straight line going through the origin with gradient 2. For $t \ge 1$, the graph, $v = 4 - 2t$, is again a straight line with gradient -2, so slopes downwards to the right, and v-intercept at 4. Note that at $t = 2$, $v = 4 - (2 \times 2) = 0$, hence v cuts the t axis at 2.