Gradient Intercept and General Form Conversion

Question Bank

NOTE: For answers that are fractions, leave them as fractions but simplify them if possible.

1. Equations of the form $y = mx + c$ are in gradient-intercept form. So called, because m (the coefficient of x) tells you the gradient of the line and c tells you the y-intercept of the line. As a warm up, for each of the following equations determine i) their gradient, and ii) their y-intercept.

   a) $y = 2x + 5$

   b) $y = 3x - 2$

   c) $y = -x + 3$

   d) $y = -3x + 13$

   e) $y = 155x + 240$

   f) $y = \frac{1}{3}x - 3$

   g) $y = \frac{x}{2} + 23$

   h) $y = -\frac{3}{7}x - \frac{4}{9}$

   i) $y = -\frac{2x}{5} + \frac{6}{5}$

2. An often under-stressed feature of the gradient-intercept form is that y **must have a coefficient of 1**, hence an equation such as $3y = 6x - 5$ is not in gradient-intercept from and we **cannot** say 6 is the gradient and -5 is the y-intercept. We must divide both sides by the current coefficient of y (3) to make y's coefficient 1,

$$\begin{aligned} \frac{3y}{3} &= \frac{6x - 5}{3}, \\ y &= \frac{6x}{3} - \frac{5}{3}, \\ y &= 2x - \frac{5}{3}. \end{aligned}$$

   For each of the following equations, i) convert them into gradient-intercept form, ii) determine their gradient and iii) determine their y-intercept.

   a) $2y = 4x - 6$

   b) $3y = -6x + 12$

   c) $-5y = 5x + 25$

   d) $-7y = -21x - 28$

e) $2y = 5x + 6$

f) $-5y = 15x - 17$

g) $-6y = -15x + 42$

h) $3y = -9x + 13$

i) $-3y = -5x - 8$

j) $8y = 12x - 4$

k) $4y = 3x + 18$

l) $-9y = 21x + 39.$

m) $\frac{y}{2} = 2x - \frac{1}{2}$

n) $\frac{y}{3} = -\frac{4}{3}x + 12$

o) $-\frac{y}{5} = 2x - 8$

p) $-\frac{y}{2} = -\frac{3x}{2} - \frac{7}{6}$

q) $\frac{3y}{2} = 6x + 15$

r) $\frac{5y}{3} = -x - 15$

s) $-\frac{2y}{7} = \frac{3x}{14} + 4$

t) $-\frac{9}{4}y = -\frac{27}{2}x + \frac{7}{4}$

3. The general form of an equation is $ax + by + c = 0$. In this form c **is not the same** as the c in the gradient-intercept form, and **does not** represent the y-intercept. Since this form does not tell us much information we usually convert from general form into gradient-intercept form if we plan to draw the line.

Answers

1. a) i) 2
   ii) 5
   b) i) 3
   ii) -2
   c) i) -1
   ii) 3
   d) i) -3
   ii) 13
   e) i) 155
   ii) 240
   f) i) $\frac{1}{3}$
   ii) -3
   g) i) $\frac{1}{2}$
   ii) 23
   h) i) $-\frac{3}{7}$
   ii) $-\frac{4}{9}$
   i) i) $-\frac{2}{5}$
   ii) $\frac{6}{5}$

2. a) i) $y = 2x - 3$
   ii) 2
   iii) -3
   b) i) $y = -2x + 4$
   ii) -2
   iii) 4
   c) i) $y = -x - 5$
   ii) -1
   iii) -5
   d) i) $y = 3x + 4$
   ii) 3
   iii) 4
   e) i) $y = \frac{5}{2}x + 3$
   ii) $\frac{5}{2}$
   iii) 3
   f) i) $y = -3x + \frac{17}{5}$
   ii) -3
   iii) $\frac{17}{5}$
   g) i) $y = \frac{5}{2}x - 7$
   ii) $\frac{5}{2}$
   iii) -7
   h) i) $y = -3x + \frac{13}{3}$
   ii) -3
   iii) $\frac{13}{3}$
   i) i) $y = \frac{5}{3}x + \frac{8}{3}$
   ii) $\frac{5}{3}$
   iii) $\frac{8}{3}$
   j) i) $y = \frac{3}{2}x - \frac{1}{2}$
   ii) $\frac{3}{2}$
   iii) $-\frac{1}{2}$
   k) i) $y = \frac{3}{4}x + \frac{9}{2}$

ii) $\frac{3}{4}$

iii) $\frac{9}{2}$

l) i) $y = -\frac{7}{3}x - \frac{13}{3}$

ii) $-\frac{7}{3}$

iii) $-\frac{13}{3}$

m) i) $y = 4x - 1$

ii) 4

iii) -1

n) i) $y = -4x + 36$

ii) -4

iii) 36

o) i) $y = -10x + 40$

ii) -10

iii) 40

p) i) $y = 3x + \frac{7}{3}$

ii) 3

iii) $\frac{7}{3}$

q) i) $y = 4x + 10$

ii) 4

iii) 10

r) i) $y = -\frac{3}{5}x - 9$

ii) $-\frac{3}{5}$

iii) -9

s) i) $y = -\frac{3}{4}x - 14$

ii) $-\frac{3}{4}$

iii) -14

t) i) $y = 6x - \frac{7}{9}$

ii) 6

iii) $-\frac{7}{9}$