

4.11 Exam: Polynomial and rational functions

CCSS.HSF.IF.C.7

1. Shown in the plot below is the function $f(x) = -x^3 + 13x - 12$.

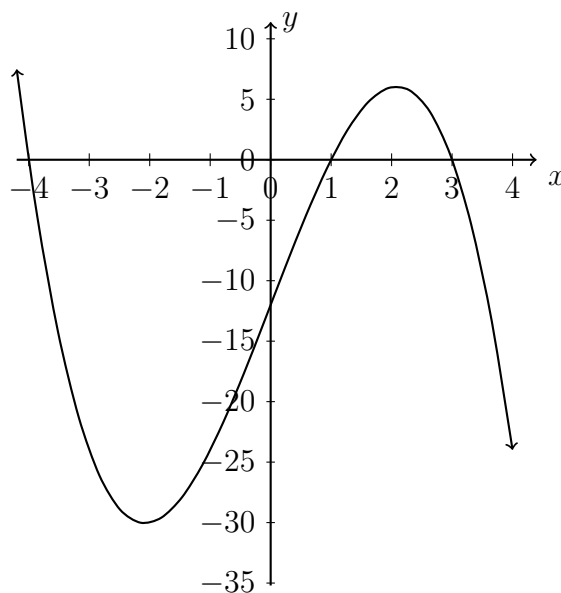
(a) Write down the value of $f(0)$.

(b) Write down the solutions to $f(x) = 0$.

(c) Mark the portion of the function that is *increasing* with a squiggly line.

(d) Label the local maximum and local minimum as ordered pairs.

(e) Show that 1 is an x -intercept because $x = 1$ is a solution to $f(x) = 0$.



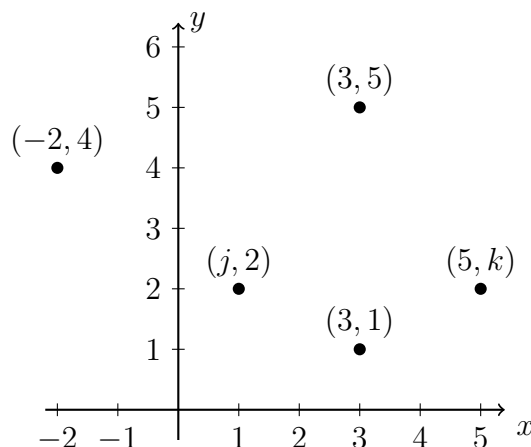
2. A relation composed of five points $\{(-2, 4), (j, 2), (3, 1), (3, 5), (5, k)\}$ is plotted on the below.

(a) Write down j

(b) Write down k

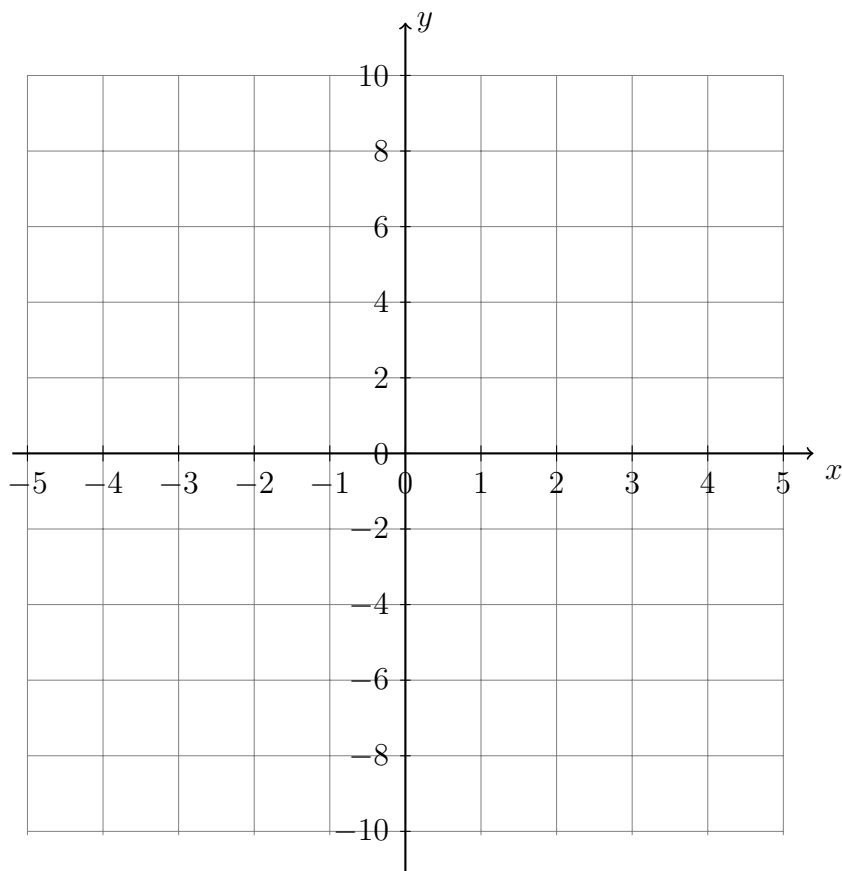
(c) Write down the range.

(d) Name a point that, if removed, would make the relation a function.



3. Accurately plot the function $h(x) = -x^3 + 3x^2 + 6x - 8$.

Mark the local maximum and minimums as ordered pairs.



4. The function $f(x) = ax^2 + bx + c$ is graphed below over its domain, $p \leq x < q$.

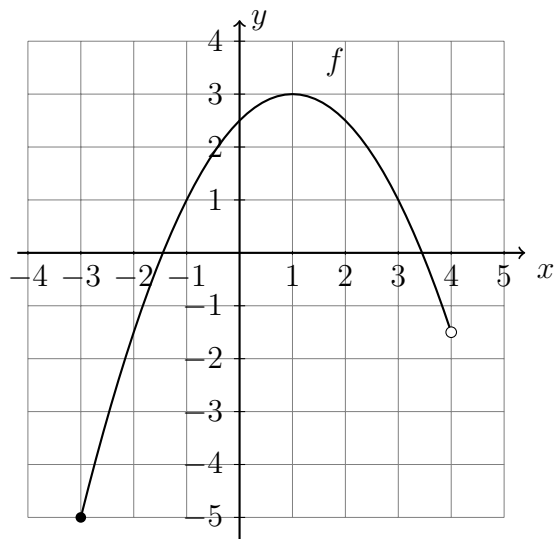
(a) Write down the maximum value of f .

(b) Write down $f(-3)$.

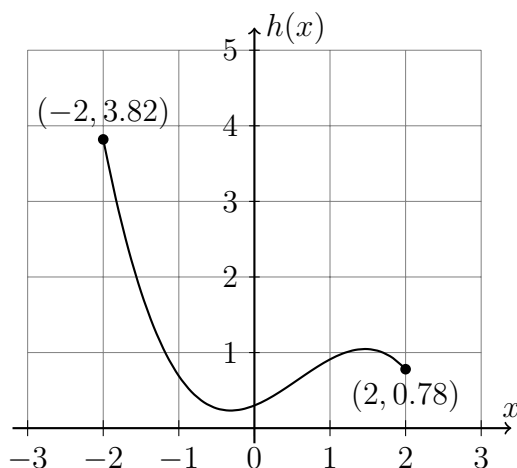
(c) Find two values for x such that $f(x) = 1$.

(d) Write down the values of p, q .

(e) Write down the range of f .



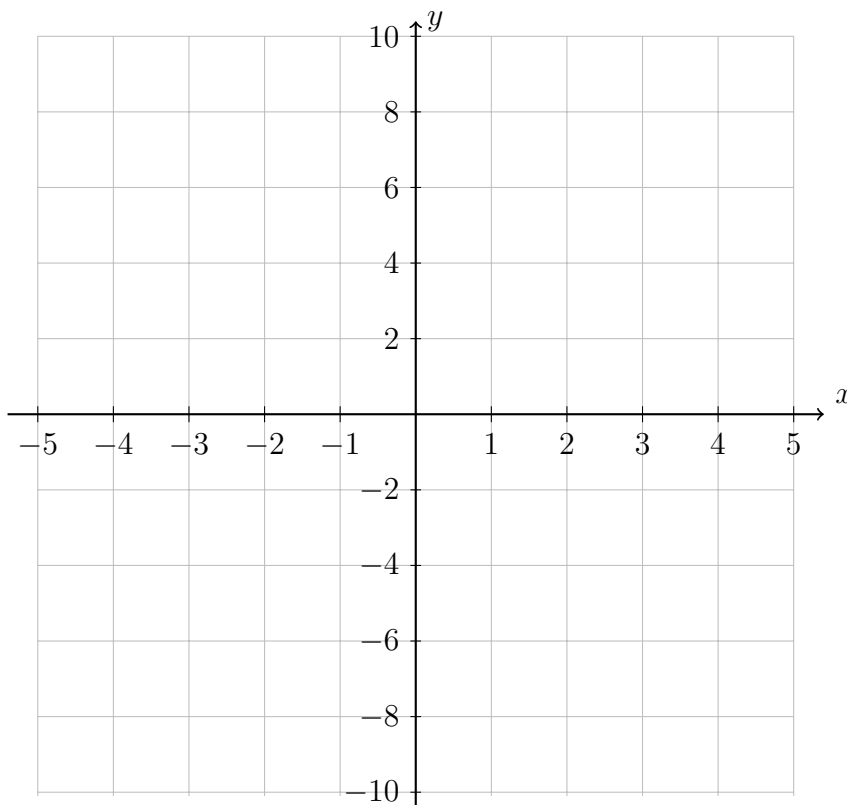
5. A pool slide is modeled by the cubic function $h(x) = 0.3 + 0.4x + 0.5x^2 - 0.29x^3$ where h is the height in meters above ground and x is the horizontal distance (in meters).



- (a) The two ends of the slide are marked as ordered pairs. How wide horizontally is the slide in meters?
- (b) What is the total vertical descent from the top of the slide to its lowest point?

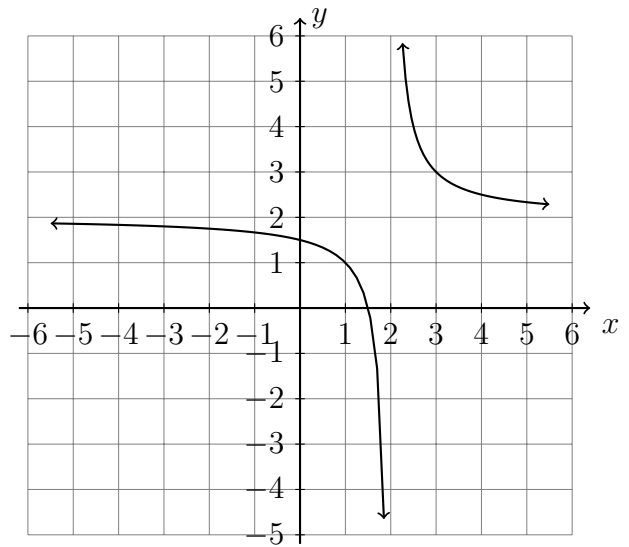
6. Accurately plot the two functions, $f(x) = 1.75x^2 + 5.1x - 2$ and $g(x) = 2.5x + 3.4$.

Mark and label the two intersections, $f(x) = g(x)$, as ordered pairs. Round to the nearest hundredth.



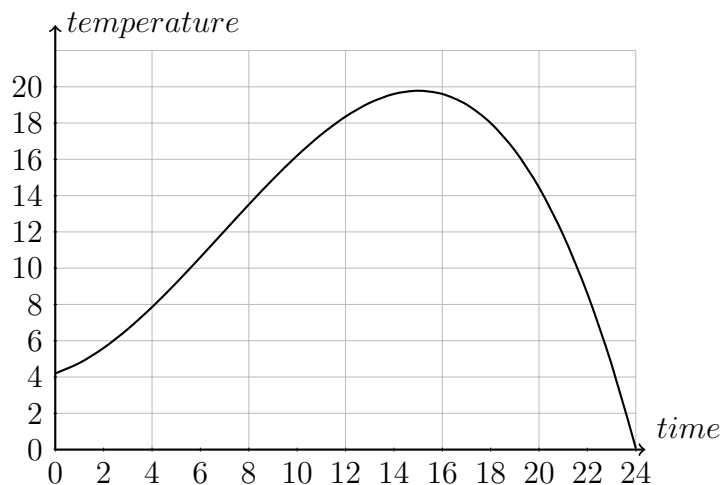
7. A rational function of the form $f(x) = \frac{1}{x-p} + q$ is shown on the grid below.

- (a) Write down the equation of the horizontal asymptote.
- (b) Write down the equation of the vertical asymptote.
- (c) Hence, write down p and q .
- (d) Find $f(0)$.
- (e) Solve for x such that $f(x) = 1$.



8. The temperature (C°) over a 24 hour day starting at midnight is modeled by the function $f(t) = -0.0073t^3 + 0.15t^2 + 0.43t + 4.2$.

- (a) Write down the temperature at midnight, when $t = 0$.
- (b) Over what interval is the temperature increasing?
- (c) Find the maximum temperature during the day.



Linear functions**CCSS.8.F.B.4**

9. A linear function f is graphed below.

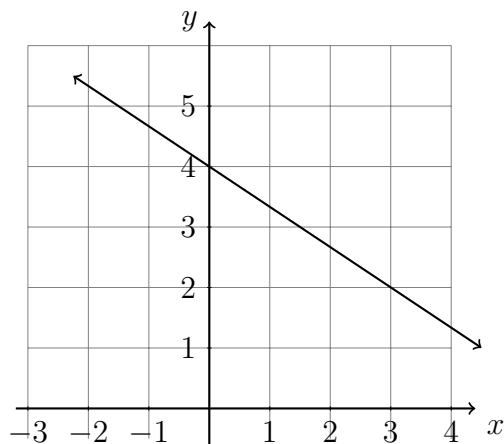
(a) Write down its slope.

$m =$

(b) Write down its y -intercept.

$b =$

(c) Write down the equation of the line.



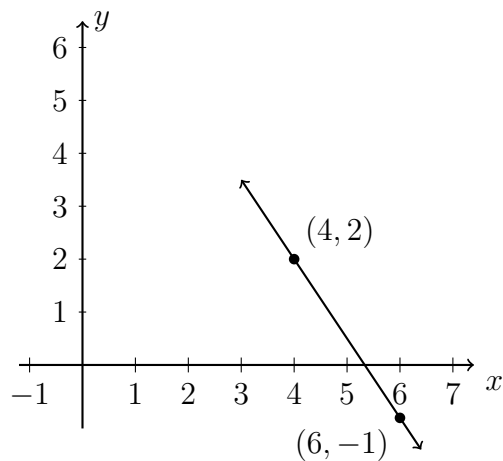
10. Write the linear equation $y + 5 = 3(x - 2)$ in the form $y = mx + c$.

11. A line has a gradient (slope) of $-\frac{2}{3}$ and passes through the point $(6, -1)$. Find the equation of the line in the form $y = mx + c$.

12. A line goes through the points $(4, 2)$ and $(6, -1)$.

(a) Find the gradient of the line.

(b) Find the equation of the line in the form $y = mx + c$.



13. A linear equation is desired to model a set of data.

(a) Plot the following points on the grid: $(-4, 6)$, $(-3, 4)$, $(-1, 5)$, $(1, 3)$, $(3, 4)$, $(5, 2)$

(b) Draw a line of best fit through the data. (use a straight edge for full credit)

