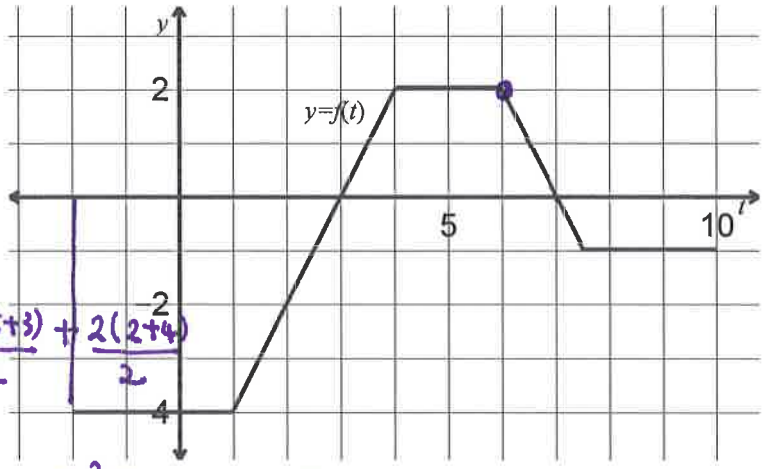
key.

IB Math HL1 Applying the Fundamental Theorems of Calculus

1. Given is the graph of $y = f(t)$. Another function is defined as $g(x) = \int_{-2}^{x} f(t)dt$, $-2 \le x \le 10$.

Find the following.



a. $g(-2) =$ 0

$= \int_{-2}^{-2} f(t)dt$

b. $g(7) =$ −10

$= \int_{-2}^{7} f(t)dt = -\left(\frac{4+3}{2}\cdot 5\right) + \left(\frac{2+4}{2}\cdot 2\right) = -\frac{4(5+3)}{2} + \frac{2(2+4)}{2}$

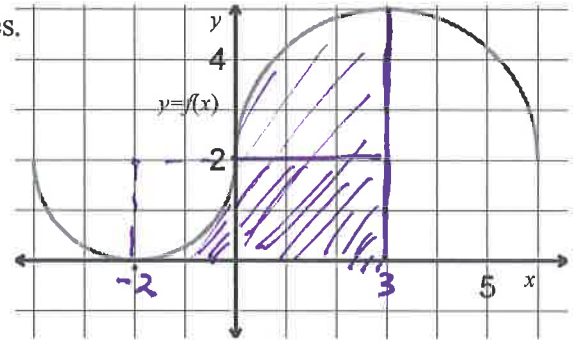
c. $g(10) - g(3) =$ ~~3.25~~

$= \int_{-2}^{10} f(t)dt - \int_{-2}^{3} f(t)dt = \int_{3}^{10} f(t)dt = \left(\frac{2+4}{2}\cdot 2\right) - \left(\frac{3+2.5}{2}\cdot 1\right) = \frac{2(2+4)}{2} - \frac{3+2.5}{2}$

d. $g'(6) =$ 2

$\frac{d}{dt}\int_{-2}^{6} f(t)dt = f(6) = 2$

2. The graph of the function $y = f(x)$ consists of two semicircles.

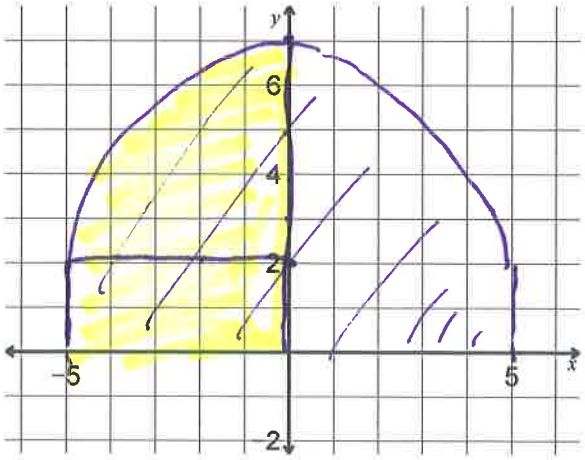


Find the exact value of the following integral:

$\int_{-2}^{3} f(x)dx = \left[4 - \frac{1}{4}\pi\cdot 2^2\right] + [6] + \left[\frac{1}{4}\pi\cdot 3^2\right]$

$= 10 + \frac{5}{4}\pi$

3. Sketch the function $f(x) = 2 + \sqrt{25 - x^2}$ on the provided grid and evaluate the exact value of the given integral by interpreting it in terms of areas:



$\int_{-5}^{0} f(x)dx = 2\times 5 + \frac{1}{4}\cdot\pi\cdot 5^2$

$= 10 + \frac{25}{4}\pi$