Outcome 1 – Finding the derivative at a particular point

Bronze examples

Examples...
1. f'(x)
2. f'(number)

A function is given as $f(x) = x^2 - 6x + 15$.

Calculate f'(4).

$f'(x) = 2x - 6$

$f'(4) = 8 - 6 = 2$

A function is given as $h(r) = 3r^3 - 5r^2 - 2r + 9$.

Calculate h'(-1).

$h'(r) = 9r^2 - 10r - 2$

$h'(-1) = 9 + 10 - 2 = 17$

Bronze questions

For the functions below, calculate the following...

1. $f(x) = 5x^2 + 2x - 8$ $f'(6)$
2. $g(x) = 3x^2 - 17x$ $g'(1)$
3. $h(r) = 7r^3 - 20$ $h'(-2)$
4. $v(r) = 4r^2 + 11$ $v'(3)$
5. $A(x) = x^2 - 5x + 8$ $A'(10)$
6. $C(p) = p^3 + 9p - 2$ $C'(-4)$
7. $v(t) = 5t^3 + 3t^2 - t$ $v'(2)$
8. $f(x) = x^3 + x^2 - 6x + 10$ $f'(½)$

Outcome 2 – Harder substitution!

Silver example

Examples...
1. f'(x)
2. f'(number)

A function is given as $g(x) = \frac{9}{x^4}$

Get it in a form you can differentiate first!

Calculate g'(-2).

Re-write with positive indices!!

$g(x) = 9x^{-4}$

$g'(x) = -36x^{-5} = -\frac{36}{x^5}$

$g'(-2) = -\frac{36}{(-2)^5} = -\frac{36}{(-32)} = \frac{9}{8}$

Silver questions

For the functions below, calculate...

1. $f(x) = \frac{9}{x^2}$ Calculate f'(2)
2. $h(x) = \frac{7}{x}$ Calculate h'(3)
3. $g(x) = \frac{3}{2x^2}$ Calculate g'(-4)
4. $p(t) = \frac{1}{3t^{½}}$ Calculate p'(9)
5. $A(t) = \frac{9}{\sqrt[3]{x}}$ Calculate A'(8)
6. $f(x) = \frac{x^3 + 2}{\sqrt{x}}$ Calculate f'(4)

Outcome 3 – Rates of change

Gold example

Examples...
1. f'(x)
2. f'(number)

If $A(r) = 2\pi r^2 + 6\pi r$, what is the rate of change of A with respect to r when r = 10?

$A(r) = 2\pi r^2 + 6\pi r$

Remember, π is just a constant!

$A'(r) = 4\pi r + 6\pi$

$A'(10) = 40\pi + 6\pi = 46\pi$

Gold questions

Find the rate of change of...

1. $A(r) = 4\pi r^2$ when $r = 5$
2. $A(r) = \pi r^2$ when $r = 3$
3. $A(r) = 2\pi r^2 + 10\pi r$ when $r = 4$
4. $v(r) = \frac{4}{3}\pi r^3$ when $r = 7$
5. $v(r) = 5\pi r^3 + 3\pi r$ when $r = 2$
6. $v(r) = 6\pi r^3 + 2\pi r^2$ when $r = 40$

Bronze Answers

1. $f'(6) = 62$
2. $g'(1) = -11$
3. $h'(-2) = 84$
4. $v'(3) = 24$
5. $A'(10) = 15$
6. $C'(-4) = 57$
7. $v'(2) = 71$
8. $f'(1/2) = -17/4$

Silver Answers

1. $f'(2) = -9/4$
2. $h'(3) = -7/9$
3. $g'(-4) = 3/64$
4. $p'(9) = -1/162$
5. $A'(8) = -3/16$
6. $f'(4) = 159/8$

Gold Answers

1. $A'(5) = 40\pi$
2. $A'(3) = 6\pi$
3. $A'(4) = 26\pi$
4. $v'(7) = 196\pi$
5. $v'(2) = 63\pi$
6. $v'(40) = 28\,960\pi$