9 Find the complete set of values of the constant c for which the cubic equation

$$2x^3 - 3x^2 - 12x + c = 0$$

has three distinct real solutions.

A $-20 < c < 7$

B $-7 < c < 20$

C $c > 7$

D $c > -7$

E $c < 20$

F $c < -20$

For this cubic equation to have 3 distinct, real solutions, we need one stationary point (s.p.) above the x-axis, and the other one below

Setting the derivative $f'(x)=0$ will give the x-ordinates of these s.p.s

Let $f(x) = 2x^3 - 3x^2 - 12x + c$

Then $f'(x) = 6x^2 - 6x - 12$

I have $6x^2 - 6x - 12 = 0$

which gives $x^2 - x - 2 = 0$

$(x-2)(x+1) = 0$

and I have an s.p. at $x=-1$ and another at $x=2$

$f(-1) = 2(-1)^3 - 3(-1)^2 - 12(-1) + c = 7 + c$

$f(2) = 2(2)^3 - 3(2)^2 - 12(2) + c = c - 20$

This cubic has a positive coefficient of x^3 so it will look something like in $\boxed{\text{Figure 1}}$, with the s.p.s being $(-1, 7+c)$ and $(2, c-20)$

To keep $(-1, 7+c)$ above the x-axis, and $(2, c-20)$ below, I need

$7 + c > 0$ and $c - 20 < 0$

which give $c > -7$ and $c < 20$

Therefore the correct answer is B

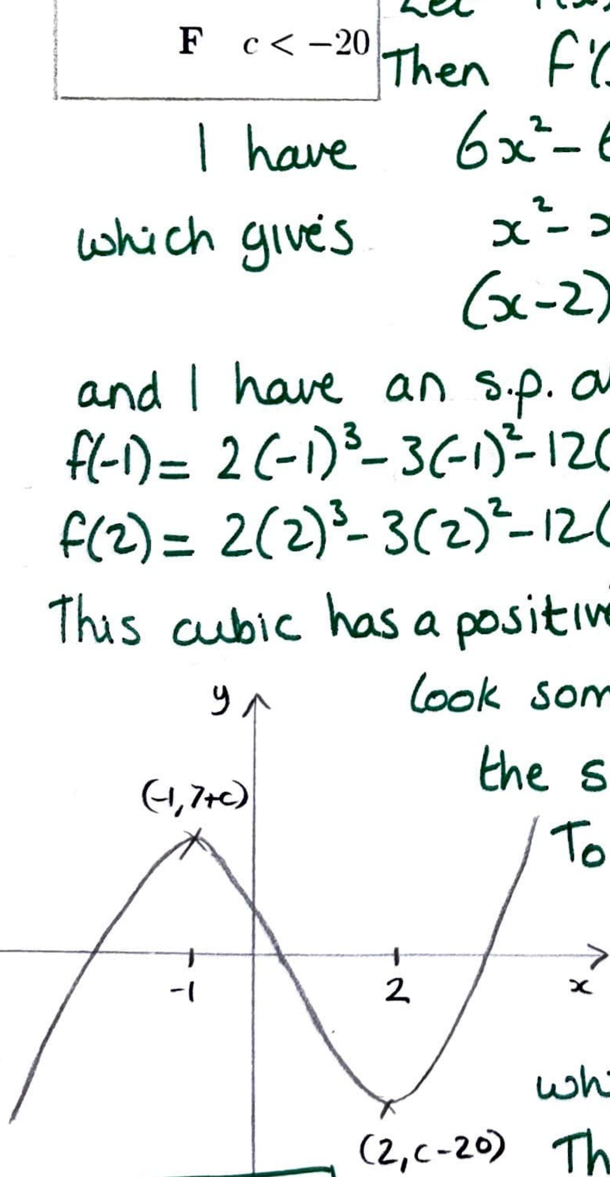

Figure 1