13	1	The polynomial $P(x) = x^3 - 4x^2 - 6x + k$ has a factor $x - 2$. What is the value of k? (A) 2 (B) 12 (C) 20 (D) 36	1

C

State Mean: **0.92**

$$P(x) = x^3 - 4x^2 - 6x + k$$
$$P(2) = (2)^3 - 4(2)^2 - 6(2) + k = 0$$
$$8 - 16 - 12 + k = 0$$
$$k = 20$$

* These solutions have been provided by *projectmaths* and are not supplied or endorsed by the Board of Studies

(i) A factor of (x – 3) means $P(3) = 0$:

$P(3) = (3 + 1)(3 - 3)Q(3) + 3a + b = 0$

$3a + b = 0$ ..... (1)

Also, P(–1) = 8:

$P(-1) = (-1 + 1)(-1 - 3)Q(-1) - a + b = 8$

$-a + b = 8$ ..... (2)

(1) – (2): $4a = -8$

$a = -2$

Subs in (1): $3(-2) + b = 0$

$-6 + b = 0$

$b = 6$

$\therefore a = -2$ and $b = 6$

(ii) As $P(x) = (x + 1)(x - 3)Q(x) - 2x + 6$, then the remainder is $-2x + 6$

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Board of Studies: Notes from the Marking Centre

(i) While many candidates interpreted the information given in the question sufficiently to write a statement like $P(3) = 0$, they did not use this to substitute correctly into the expression for $P(x)$. Some tried to solve convoluted equations.

(ii) A substantial number of candidates did not attempt this part. Of those who attempted it, many substituted their values of a and b from (i) into $P(x)$ but then attempted either to solve or to divide, indicating that they had not really understood the notion of a polynomial remainder. A few candidates correctly identified the remainder.

Source: http://www.boardofstudies.nsw.edu.au/hsc_exams/