

Precalculus - Polynomial Division and the Factor Theorem - Test Answer Key

Common Core A-APR.B.2, A-APR.D.6, A-APR.B.3 · maths-pdf.fr/en/

Worked solutions and scoring notes for the 9-question polynomial division test. Use the scoring lines to award partial credit.

Precalculus · Common Core State Standards: **A-APR.B.2, A-APR.D.6, A-APR.B.3**

Question 1 - Divide and factor [2 pts]

2	1	-1	-14	24
		2	2	-24
	1	1	-12	0

$$c = 2.$$

Quotient $x^2 + x - 12 = (x + 4)(x - 3)$, remainder 0.

$$(x - 2)(x + 4)(x - 3)$$

Scoring: 1 point for the division, 1 point for factoring the quotient.

Question 2 - Synthetic division with a remainder [2 pts]

Coefficients 1, 2, 0, -1, 4 with $c = -1$: bottom row 1, 1, -1, 0, 4.

$$x^3 + x^2 - x + \frac{4}{x+1}$$

Scoring: 1 point for the bottom row (including the 0 placeholder), 1 point for the written result.

Question 3 - Remainder Theorem [2 pts]

$$f(3) = 54 - 45 + 3 - 7 = 5.$$

5

Scoring: 1 point for substituting 3, 1 point for the value.

Question 4 - Factor Theorem [2 pts]

$$f(-1) = -1 + k + 2 + 8 = k + 9 = 0, \text{ so } k = -9.$$

$$k = -9$$

Scoring: 1 point for setting $f(-1) = 0$, 1 point for k .

Question 5 - Find all zeros [3 pts]

2	2	1	-13	6
		4	10	-6
	2	5	-3	0

$$c = 2.$$

(a) $\pm 1, \pm 2, \pm 3, \pm 6, \pm \frac{1}{2}, \pm \frac{3}{2}$. (b) Bottom row 2, 5, -3, 0: remainder 0. (c) $2x^2 + 5x - 3 = (2x - 1)(x + 3)$.

$$x = 2, \frac{1}{2}, -3$$

Scoring: 1 point for each part.

Question 6 - Division with a remainder expression [2 pts]

Synthetic division with $c = 2$: 4, 5 and remainder 11.

$$4x^2 - 3x + 1 = (x - 2)(4x + 5) + 11$$

Scoring: 1 point for $q(x)$, 1 point for r .

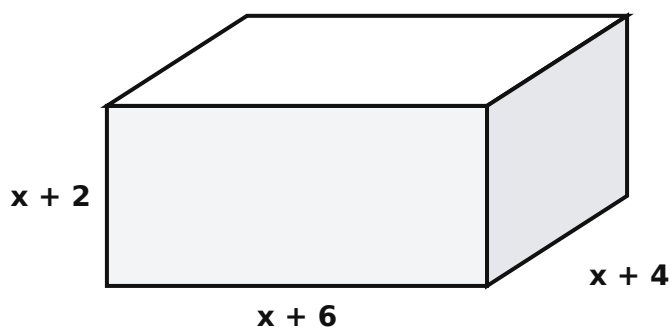
Question 7 - Biquadratic zeros [2 pts]

$$u = x^2: u^2 - 13u + 36 = (u - 4)(u - 9).$$

$$x = \pm 2, \pm 3$$

Scoring: 1 point for the substitution and factoring, 1 point for all four zeros.

Question 8 - Dimensions of a box [3 pts]



Dimensions $x + 2$, $x + 4$, $x + 6$.

(a) Synthetic division with $c = -2$: $1, 12, 44, 48 \rightarrow 1, 10, 24$, remainder 0, quotient $x^2 + 10x + 24$. (b) $(x+4)(x+6)$. (c) $5 \cdot 7 \cdot 9 = 315$.

$x^2 + 10x + 24$; $x+4$ **and** $x+6$; 315 in^3

Scoring: 1 point for each part.

Question 9 - Build a polynomial [2 pts]

$(2x+1)(x-1)(x-4) = (2x+1)(x^2-5x+4) = 2x^3-9x^2+3x+4$.

$2x^3-9x^2+3x+4$

Scoring: 1 point for the factors (with $2x + 1$), 1 point for the expansion.

Total

20 points