

Algebra 2 - Dividing Polynomials and the Remainder Theorem - Test Answer Key

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

Use this answer key and scoring guide to grade the test on polynomial division and the Remainder Theorem (A-APR.B.2). Each solution shows the full reasoning, and the scoring note explains how many points to award for correct setup, correct work, and a correct final answer. Partial credit rewards a sound method even when a small arithmetic slip changes the result.

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

Question 1 - Long division [3 pts]

1. Divide the leading terms: $2x^3 \div 2x$ gives x^2 . Multiply: $x^2(2x-1) = 2x^3 - x^2$. Subtract: $2x^3 + 5x^2 - 14x + 8 - (2x^3 - x^2) = 6x^2 - 14x + 8$.
2. Divide the leading terms: $6x^2 \div 2x$ gives $3x$. Multiply: $3x(2x-1) = 6x^2 - 3x$. Subtract: $6x^2 - 14x + 8 - (6x^2 - 3x) = -11x + 8$.
3. Divide the leading terms: $-11x \div 2x$ gives $-\frac{11}{2}$. Multiply: $-\frac{11}{2}(2x-1) = -11x + \frac{11}{2}$. Subtract: $-11x + 8 - (-11x + \frac{11}{2}) = \frac{5}{2}$.

Quotient $x^2 + 3x - \frac{11}{2}$, remainder $\frac{5}{2}$.

Check: $(2x-1)(x^2 + 3x - \frac{11}{2}) + \frac{5}{2} = 2x^3 + 5x^2 - 14x + 8$.

$$x^2 + 3x - \frac{11}{2} + \frac{\frac{5}{2}}{2x-1}$$

Scoring: 1 point for the first quotient term, 1 point for the remaining steps, 1 point for the quotient and remainder.

Question 2 - Synthetic division [3 pts]

Coefficients with a 0 for x : 3, -5, 0, 4. Bottom row for $k = 2$: 3, 1, 2, 8.

$$3x^2 + x + 2 + \frac{8}{x-2}$$

Scoring: 1 point for including the 0 coefficient, 1 point for the bottom row, 1 point for the answer form.

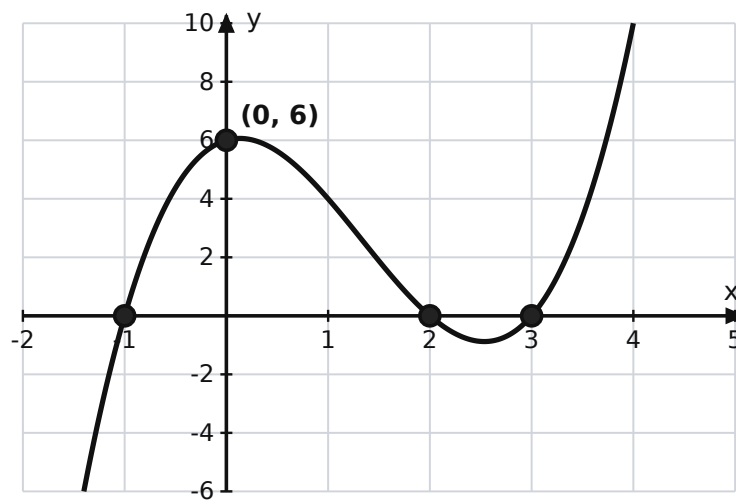
Question 3 - Remainder Theorem [2 pts]

$$p(-3) = -27 + 18 + 27 - 18 = 0.$$

Remainder 0; yes, $x + 3$ is a factor

Scoring: 1 point for evaluating $p(-3)$, 1 point for the conclusion.

Question 4 - Graph and factors [2 pts]



y-intercept (0, 6).

Zeros -1, 2, 3 give $p(x) = (x+1)(x-2)(x-3)$.

$$p(0) = (1)(-2)(-3) = 6.$$

$$\mathbf{p(x) = (x + 1)(x - 2)(x - 3); p(0) = 6}$$

Scoring: 1 point for the factored form, 1 point for $p(0)$.

Question 5 - Find the unknown [2 pts]

$$p(5) = 125 - 75 + 5k + 10 = 60 + 5k = 0, \text{ so } k = -12.$$

$$k = -12$$

Scoring: 1 point for $p(5) = 0$, 1 point for k .

Question 6 - Quotient form [2 pts]

1. Divide the leading terms: $x^2 \div x$ gives x . Multiply: $x(x+1) = x^2 + x$. Subtract:
 $x^2 + 4x + 7 - (x^2 + x) = 3x + 7$.
2. Divide the leading terms: $3x \div x$ gives 3. Multiply: $3(x+1) = 3x + 3$. Subtract:
 $3x + 7 - (3x + 3) = 4$.

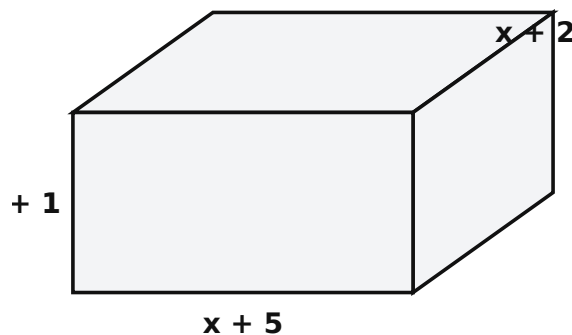
Quotient $x+3$, remainder 4.

Check: $(x+1)(x+3)+4 = x^2+4x+7$.

$$x+3+\frac{4}{x+1}$$

Scoring: 1 point for the quotient, 1 point for the remainder term.

Question 7 - Storage bin [2 pts]



Width found: $x + 2$.

Width = volume divided by (length times height) = $(x^3+8x^2+17x+10) \div (x^2+6x+5)$.

1. Divide the leading terms: $x^3 \div x^2$ gives x . Multiply: $x(x^2+6x+5) = x^3+6x^2+5x$. Subtract:
 $x^3+8x^2+17x+10 - (x^3+6x^2+5x) = 2x^2+12x+10$.
2. Divide the leading terms: $2x^2 \div x^2$ gives 2. Multiply: $2(x^2+6x+5) = 2x^2+12x+10$. Subtract:
 $2x^2+12x+10 - (2x^2+12x+10) = 0$.

Width $x + 2$ inches

Scoring: 1 point for dividing by the product of length and height, 1 point for the width.

Question 8 - Find the error [2 pts]

1	1	0	2	-3
		1	1	3
	1	1	3	0

Correct grid with a 0 for x^2 .

Jamal left out the 0 coefficient for x^2 . The correct coefficients are 1,0,2,-3.

Bottom row with $k=1$: 1, 1, 3, 0.

Quotient x^2+x+3 , **remainder 0**

Scoring: 1 point for identifying the missing zero, 1 point for the correct quotient and remainder.

Question 9 - Factor completely [2 pts]

1. Divide the leading terms: $x^3 \div x$ gives x^2 . Multiply: $x^2(x+1) = x^3 + x^2$. Subtract:
 $x^3 + 6x^2 + 11x + 6 - (x^3 + x^2) = 5x^2 + 11x + 6$.
2. Divide the leading terms: $5x^2 \div x$ gives $5x$. Multiply: $5x(x+1) = 5x^2 + 5x$. Subtract:
 $5x^2 + 11x + 6 - (5x^2 + 5x) = 6x + 6$.
3. Divide the leading terms: $6x \div x$ gives 6. Multiply: $6(x+1) = 6x + 6$. Subtract:
 $6x + 6 - (6x + 6) = 0$.

Quotient x^2+5x+6 , remainder 0.

Check: $(x+1)(x^2+5x+6)+0 = x^3+6x^2+11x+6$.

$$x^2+5x+6$$

$$x^2+5x+6 = (x+2)(x+3).$$

$$(x+1)(x+2)(x+3)$$

Scoring: 1 point for the quotient, 1 point for the complete factorization.

Total

20 points