

Algebra 2 · Polynomial Division and the Remainder Theorem · Test

Common Core A-APR.B.2, A-APR.D.6, A-APR.C.4 · mathovore.fr

Name: _____ Date: ____/____/____ Score: _____

This 45-minute test has 9 questions worth 20 points in total. It covers long division, synthetic division, the Remainder and Factor Theorems, and a polynomial identity. Show all work; a calculator is not required.

Test information

- **Grade:** Algebra 2
- **Chapter:** Polynomial Division and the Remainder Theorem
- **Common Core:** A-APR.B.2, A-APR.D.6, A-APR.C.4
- **Time:** 45 minutes
- **Total:** 20 points (Question 1: 2 pts; Question 2: 2 pts; Question 3: 2 pts; Question 4: 3 pts; Question 5: 2 pts; Question 6: 2 pts; Question 7: 2 pts; Question 8: 3 pts; Question 9: 2 pts)

Question 1: Long division (2 points)

Divide x^3+2x^2-6x+5 by $x-1$. Write the quotient and the remainder.

Question 2: Division with a missing term (2 points)

Divide x^4-5x^2+3x-2 by $x+2$. Write the quotient and the remainder.

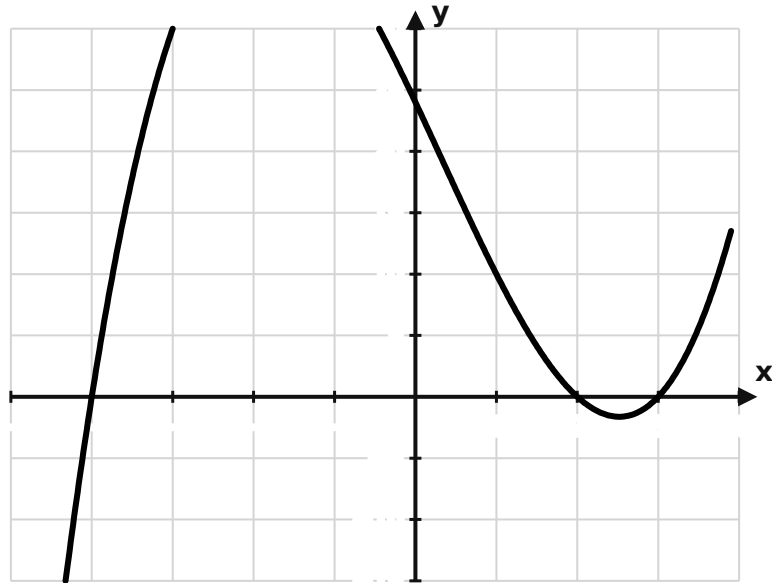
Question 3: Remainder Theorem (2 points)

Let $p(x)=2x^3-x^2-7x+6$.

- Find the remainder when $p(x)$ is divided by $x-3$. (1 point)
- The remainder when $p(x)$ is divided by $x+2$ is 0. What does this tell you about $x+2$? (1 point)

Question 4: Factor Theorem and zeros (3 points)

The graph of $f(x) = x^3 - x^2 - 14x + 24$ is shown.



The graph of $f(x) = x^3 - x^2 - 14x + 24$.

- Show that $x-2$ is a factor of $f(x)$. (1 point)
- Write $f(x)$ as a product of three linear factors. (1 point)
- State the x-intercepts of the graph. (1 point)

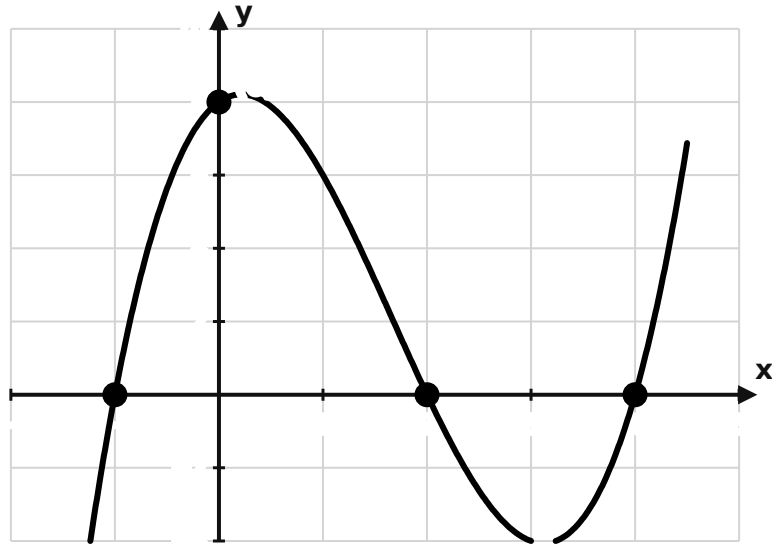
Question 5: Find k and factor (2 points)

The binomial $x+3$ is a factor of $p(x) = x^3 + kx^2 - 5x + 3$.

- Find k . (1 point)
- Factor $p(x)$ completely. (1 point)

Question 6: Function from a graph (2 points)

The graph of a cubic function f with leading coefficient 1 is shown.

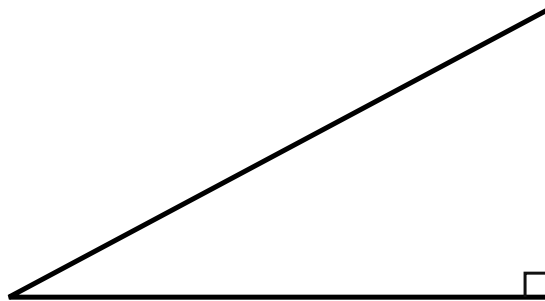


A cubic function f with leading coefficient 1, zeros $-1, 2, 4$, and y-intercept 8.

- Write $f(x)$ in factored form. (1 point)
- Find the remainder when $f(x)$ is divided by $x-5$. (1 point)

Question 7: Polynomial identity (2 points)

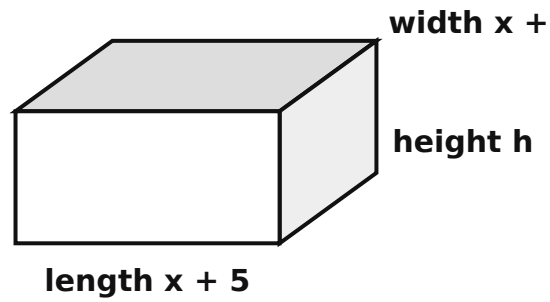
- Show that $(x^2+y^2)^2 = (x^2-y^2)^2 + (2xy)^2$ by expanding. (1 point)
- Use the identity with $x=4$ and $y=1$ to find the sides of a right triangle with legs x^2-y^2 and $2xy$. (1 point)



A right triangle with legs 15 and 8.

Question 8: Dimensions of a box (3 points)

The volume of a gift box is $V(x) = x^3 + 10x^2 + 31x + 30$ cubic inches. The length is $x+5$ inches and the width is $x+2$ inches.



A box with volume $x^3 + 10x^2 + 31x + 30$ cubic inches.

- Find an expression for the height h . (2 points)
- Find the volume when $x = 4$ from the dimensions. (1 point)

Question 9: Divide by $2x + 1$ (2 points)

Divide $6x^3 - x^2 + 6x + 7$ by $2x + 1$. Write the quotient and the remainder.