

TEST YOUR SKILLS

1 TEST What is the value of x if $x > 0$ and $72x^2 = 9800$?

- A $\frac{35}{3}$
- B $\frac{7}{4}$
- C $\frac{100}{9}$
- D $3\sqrt{10}$
- E $2\sqrt{30}$

(USA University of South Carolina: High School Math Contest, 2000)

2 The sum of the squares of 6 consecutive integers is 1111. What are the integers?

(USA Southeast Missouri State University: Math Field Day, 2005)

[11, 12, 13, 14, 15, 16; -16, -15, -14, -13, -12, -11]

3 The sum of four consecutive positive whole numbers is equal to the product of the smallest number and the largest number. What are the numbers? (CAN John Abbott College, Final Exam, 2003)

[3, 4, 5, 6]

4 The roots of the equation

$$2x^2 + 6x + 3 = 0$$

are α and β . Show that $\alpha^2 + \beta^2 = 6$.

(USA North Carolina State High School Mathematics Contest, 2003)

5 TEST $\frac{2x^2 + 3x + 1}{x^2 - 2x - 3}$ cannot represent which of the following real numbers?

- A 3
- B $\frac{1}{4}$
- C $-\frac{1}{2}$
- D -1
- E $-\frac{1}{3}$

(USA Tennessee Mathematics Teachers Association: 39th Annual Mathematics Contest, 1995)

6 The graph of the quadratic function:

$$f: x \mapsto x^2 - 4x + 3, \quad x \in \mathbb{R},$$

cuts the axes at P , Q , and R as shown.

Find the coordinates for each of the points P , Q and R .

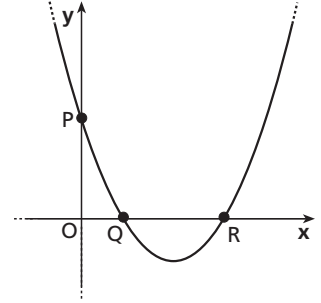
Write down the expression for $g(x)$ where $g(x) = f(-x)$.

Show that there are no real solutions to the equation:

$$f(x) + g(x) = 0.$$

(IR Leaving Certificate Examination, Ordinary Level, 1994)

$$[P(0; 3), Q(1; 0), R(3; 0), g(x) = x^2 + 4x + 3]$$



7 a) Factor over the rationals: $x^2 + 13x - 30$.
b) Factor over the reals: $2x^2 - 10$.

(USA Southern Illinois University Carbondale, Final Exam, 2002)

$$[a) (x + 15)(x - 2); b) 2(x - \sqrt{5})(x + \sqrt{5})]$$

8 TEST Solve for p : $\sqrt{2}p^2 - 3p + \sqrt{2} = 0$.

- A $\{2, \sqrt{2}\}$
- B $\left\{-\frac{\sqrt{2}}{2}, \sqrt{2}\right\}$
- C $\left\{\sqrt{2}, \frac{\sqrt{2}}{2}\right\}$
- D $\left\{-2, \frac{\sqrt{2}}{2}\right\}$
- E $\left\{2, \frac{\sqrt{2}}{2}\right\}$

(USA Tennessee Mathematics Teachers Association: 39th Annual Mathematics Contest, 1995)

9 TEST How many real solutions does the equation $\frac{2}{x+2} + \frac{1}{x-3} = \frac{5}{x^2 - x - 6}$ have?

- A 0
- B 1
- C 2
- D 3
- E None of the above.

(USA Furman University Wylie Mathematics Tournament, 2005)

10 In what positive base b does the equation $4 \cdot 12 = 103$ for multiplication of base b numbers hold?

(USA Lehigh University: High School Math Contest, 2005)

[$b = 5$]

GLOSSARY

axis (axes): asse (assi)

to cut-cut-cut: tagliare, intersecare

to factor: fattorizzare, scomporre

following: seguente

to hold-held-held: essere valido

integer: (numero) intero

quadratic: quadratico, di 2° grado

rationals: (numeri) razionali

reals: (numeri) reali

root: radice (soluzione)

to show-showed-shown:

dimostrare

square: quadrato

whole number: numero intero