Factoring Quadratics

Helpful Videos

How To Solve Quadratic Equations By Factoring
https://www.youtube.com/watch?v=qeByhTF8WEw

More examples of factoring quadratics
https://www.khanacademy.org/math/algebra/x2f8bb11595b61c86:quadratics-multiplying-factoring/x2f8bb11595b61c86:factor-quadratics-intro/v/factoring-quadratic-expressions

Exercises

1. $x^2 + 5x + 6$
2. $x^2 - 7x + 10$
3. $x^2 + 3x - 10$
4. $x^2 - 9$
5. $2x^2 + 8x$
6. $3x^2 - 7x - 6$
7. $x^2 - x - 6$
8. $x^2 + 8x + 16$
9. $4x^2 + 3x - 10$
10. $x^2 + x - 12$

Answers

1. $(x+2)(x+3)$
2. $(x-5)(x-2)$
3. $(x+5)(x-2)$
4. $(x-3)(x+3)$
5. $2x(x+4)$
6. $(3x+2)(x-3)$
7. $(x-3)(x+2)$
8. $(x+4)^2$
9. $(4x-5)(x+2)$
10. $(x+4)(x-3)$

Evaluating Functions

Helpful Videos

How To Evaluate Expressions with Variables
https://www.youtube.com/watch?v=WJqw-cxvKgo

How to evaluate algebraic expressions using substitution of given values

https://www.youtube.com/watch?v=nzuZigx9nrQ

Exercises

1. $f(x) = \sqrt{x+7},\ x = 2$
2. $g(x) = \sqrt{3x-1} + x,\ x = 3$
3. $h(x) = \sqrt{x^2+4},\ x = 5$
4. $p(x) = 2^x + 1,\ x = 3$
5. $q(x) = x^3 - 4x,\ x = -2$
6. $r(x) = 5x^2,\ x = 4$
7. $s(x) = 3x + 2,\ x = -1$
8. $t(x) = x^2 - 6x + 5,\ x = 3$
9. $u(x) = 4 - x^2,\ x = -2$
10. $v(x) = \dfrac{2x+1}{x-1},\ x = 2$

Answers

1. $f(2) = \sqrt{9} = 3$
2. $g(3) = \sqrt{8} + 3 = 2\sqrt{2} + 3$
3. $h(5) = \sqrt{29}$
4. $p(3) = 2^3 + 1 = 9$
5. $q(-2) = (-2)^3 - 4(-2) = -8 + 8 = 0$
6. $r(4) = 5(4^2) = 80$
7. $s(-1) = 3(-1) + 2 = -1$
8. $t(3) = 9 - 18 + 5 = -4$
9. $u(-2) = 4 - 4 = 0$
10. $v(2) = \frac{5}{1} = 5$

Adding and Subtracting Fractions

Helpful Videos

Adding and Subtracting Fractions with Unlike Denominators
https://www.youtube.com/watch?v=XsW8HJutIgM

How to Add and Subtract Fractions
https://www.youtube.com/watch?v=3fY1AqnrUhQ

Exercises

1. $\frac{3}{4}+\frac{5}{6}$
2. $\frac{7}{8}-\frac{1}{3}$
3. $\frac{2}{5}+\frac{9}{10}$
4. $\frac{11}{12}-\frac{3}{4}$
5. $\frac{5}{9}+\frac{2}{3}$
6. $\frac{4}{7}-\frac{1}{2}$
7. $\frac{6}{5}+\frac{3}{8}$
8. $\frac{10}{11}-\frac{2}{5}$
9. $\frac{7}{10}+\frac{1}{6}$
10. $\frac{9}{4}-\frac{5}{6}$

Answer Key

1. $\frac{9}{12}+\frac{10}{12}=\frac{19}{12}$
2. $\frac{21}{24}-\frac{8}{24}=\frac{13}{24}$
3. $\frac{4}{10}+\frac{9}{10}=\frac{13}{10}$
4. $\frac{11}{12}-\frac{9}{12}=\frac{2}{12}=\frac{1}{6}$
5. $\frac{15}{27}+\frac{18}{27}=\frac{33}{27}=\frac{11}{9}$
6. $\frac{8}{14}-\frac{7}{14}=\frac{1}{14}$
7. $\frac{48}{40}+\frac{15}{40}=\frac{63}{40}$
8. $\frac{50}{55}-\frac{22}{55}=\frac{28}{55}$
9. $\frac{21}{30}+\frac{5}{30}=\frac{26}{30}=\frac{13}{15}$
10. $\frac{27}{12}-\frac{10}{12}=\frac{17}{12}$

Multiplying and Dividing Fractions

Helpful Videos

Multiplication and Division of Fractions
https://www.youtube.com/watch?v=Q9MCRjrrd6E

Math Antics - Dividing Fractions
https://www.youtube.com/watch?v=4lkq3DgvmJo

Exercises

1. $\frac{2}{3} \times \frac{9}{4}$
2. $\frac{5}{6} \times \frac{12}{15}$
3. $\frac{7}{8} \div \frac{14}{16}$
4. $\frac{3}{5} \div \frac{6}{10}$
5. $\frac{4}{9} \times \frac{27}{8}$
6. $\frac{10}{12} \div \frac{5}{6}$
7. $\frac{6}{7} \times \frac{14}{21}$
8. $\frac{9}{10} \div \frac{3}{5}$
9. $\frac{8}{15} \times \frac{30}{16}$
10. $\frac{18}{20} \div \frac{3}{5}$

Answers

1. $\frac{2}{3} \times \frac{9}{4} = \frac{18}{12} = \frac{3}{2}$
2. $\frac{5}{6} \times \frac{12}{15} = \frac{60}{90} = \frac{2}{3}$
3. $\frac{7}{8} \div \frac{14}{16} = \frac{7}{8} \times \frac{16}{14} = \frac{112}{112} = 1$
4. $\frac{3}{5} \div \frac{6}{10} = \frac{3}{5} \times \frac{10}{6} = \frac{30}{30} = 1$
5. $\frac{4}{9} \times \frac{27}{8} = \frac{108}{72} = \frac{3}{2}$
6. $\frac{10}{12} \div \frac{5}{6} = \frac{10}{12} \times \frac{6}{5} = \frac{60}{60} = 1$
7. $\frac{6}{7} \times \frac{14}{21} = \frac{84}{147} = \frac{4}{7}$
8. $\frac{9}{10} \div \frac{3}{5} = \frac{9}{10} \times \frac{5}{3} = \frac{45}{30} = \frac{3}{2}$
9. $\frac{8}{15} \times \frac{30}{16} = \frac{240}{240} = 1$
10. $\frac{18}{20} \div \frac{3}{5} = \frac{18}{20} \times \frac{5}{3} = \frac{90}{60} = \frac{3}{2}$

Linear Functions

Helpful Videos

How To Find the Equation of a Line Given Two Points
https://www.youtube.com/watch?v=lzqTD0JWwhY

How To Write The Equation of a Line Given The Slope and a Point
https://www.youtube.com/watch?v=Ms5ojdI6UuM

Exercises

1. Find the equation of the line passing through $(1, 2)$ and $(5, 10)$
2. Find the equation of the line passing through $(-2, 3)$ and $(4, -9)$
3. Find the equation of the line passing through $(0, -4)$ and $(6, 2)$
4. Find the equation of the line passing through $(-3, 5)$ and $(3, -1)$
5. Find the equation of the line passing through $(2, -3)$ and $(8, 9)$
6. Find the equation of the line with slope $m = \frac{3}{5}$ passing through $(5, -1)$
7. Find the equation of the line with slope $m = -2$ passing through $(-1, 4)$
8. Find the equation of the line with slope $m = 0$ passing through $(6, -3)$
9. Find the equation of the line with slope $m = \frac{5}{2}$ passing through $(2, 1)$
10. Find the equation of the line with slope $m = -\frac{4}{3}$ passing through $(-3, 2)$

Answers

1. $m = \frac{10-2}{5-1} = 2,\ y = 2x$
2. $m = \frac{-9-3}{4-(-2)} = -2,\ y = -2x - 1$
3. $m = \frac{2-(-4)}{6-0} = 1,\ y = x - 4$
4. $m = \frac{-1-5}{3-(-3)} = -1,\ y = -x + 2$
5. $m = \frac{9-(-3)}{8-2} = 2,\ y = 2x - 7$
6. $y + 1 = \frac{3}{5}(x-5) \Rightarrow y = \frac{3}{5}x - 4$
7. $y - 4 = -2(x+1) \Rightarrow y = -2x + 2$
8. $y + 3 = 0(x-6) \Rightarrow y = -3$
9. $y - 1 = \frac{5}{2}(x-2) \Rightarrow y = \frac{5}{2}x - 4$
10. $y - 2 = -\frac{4}{3}(x+3) \Rightarrow y = -\frac{4}{3}x - 2$

Word Problems involving two Variables

Helpful Videos

Solving Word Problems with Two Variables
https://www.youtube.com/watch?v=ExkJm75cybI

Cost word problem in under 5min !
https://www.youtube.com/watch?v=aq-wjwIdc70

Exercises

1. The sum of two numbers is 18. One number is 4 more than the other. Find the numbers.
2. A rectangle has a length 3 units longer than its width. If the perimeter is 26 units, find the length and width.
3. A store sells pencils for $2 each and erasers for $3 each. If 5 pencils and 4 erasers cost a total of $22, find the cost of each item.
4. Twice a number plus three times another number equals 17. If the first number is 2 less than the second, find both numbers.
5. A class has adults and children. There are 30 people in total. If the number of adults is 2 more than the number of children, find how many adults and children are in the class.
6. A taxi charges $5 base fee plus $2 per mile. If a trip costs $17, how many miles was the trip?
7. A farmer has chickens and cows. There are 12 animals and 32 legs in total. How many chickens and how many cows are there?
8. A number plus twice another number equals 20. If the first number is 4, find the second number.
9. The sum of two numbers is 25. If one number is 7 less than the other, find both numbers.
10. A rectangle's length is twice its width. If the area is 50 square units, find the length and width.

Answers

1. $x + y = 18,\ y = x + 4 \Rightarrow 2x + 4 = 18 \Rightarrow x = 7,\ y = 11$

2. Width x, Length $y = x + 3,\ 2(x + y) = 26 \Rightarrow 2(x + x + 3) = 26 \Rightarrow 4x + 6 = 26 \Rightarrow x = 5,\ y = 8$

3. $5x + 4y = 22 \Rightarrow 5(2) + 4(3) = 22 \Rightarrow x = 2,\ y = 3$

4. $2x + 3y = 17,\ x = y - 2 \Rightarrow 2(y - 2) + 3y = 17 \Rightarrow 5y - 4 = 17 \Rightarrow y = 4.2,\ x = 2.2$

5. $x + y = 30,\ y = x + 2 \Rightarrow x + (x + 2) = 30 \Rightarrow 2x + 2 = 30 \Rightarrow x = 14,\ y = 16$

6. $5 + 2x = 17 \Rightarrow 2x = 12 \Rightarrow x = 6$ miles

7. $x + y = 12,\ 2x + 4y = 32 \Rightarrow y = 12 - x \Rightarrow 2x + 4(12 - x) = 32 \Rightarrow x = 8,\ y = 4$

8. $x + 2y = 20,\ x = 4 \Rightarrow 4 + 2y = 20 \Rightarrow y = 8$

9. $x + y = 25,\ y = x + 7 \Rightarrow x + (x + 7) = 25 \Rightarrow x = 9,\ y = 16$

10. Width x, Length $y = 2x,\ x \cdot y = 50 \Rightarrow x \cdot 2x = 50 \Rightarrow 2x^2 = 50 \Rightarrow x = 5,\ y = 10$

Working with Radicals

Helpful Videos

Multiplying Radicals
https://www.youtube.com/watch?v=1J6kVSu0FaE

Radical Expressions Multiplying
https://www.youtube.com/watch?v=XaRUKCWqdx0

Exercises

1. $\sqrt{2} \times \sqrt{8}$
2. $\sqrt{3} \times \sqrt{12}$
3. $\sqrt{5} \times \sqrt{20}$
4. $\sqrt{6} \times \sqrt{24}$
5. $\sqrt{7} \times \sqrt{14}$
6. $\sqrt{10} \times \sqrt{40}$
7. $\sqrt{2} \times \sqrt{18}$
8. $\sqrt{15} \times \sqrt{5}$
9. $\sqrt{8} \times \sqrt{32}$
10. $\sqrt{3} \times \sqrt{27}$

Answers

1. $\sqrt{2} \times \sqrt{8} = \sqrt{16} = 4$
2. $\sqrt{3} \times \sqrt{12} = \sqrt{36} = 6$
3. $\sqrt{5} \times \sqrt{20} = \sqrt{100} = 10$
4. $\sqrt{6} \times \sqrt{24} = \sqrt{144} = 12$
5. $\sqrt{7} \times \sqrt{14} = \sqrt{98} = 7\sqrt{2}$
6. $\sqrt{10} \times \sqrt{40} = \sqrt{400} = 20$
7. $\sqrt{2} \times \sqrt{18} = \sqrt{36} = 6$
8. $\sqrt{15} \times \sqrt{5} = \sqrt{75} = 5\sqrt{3}$
9. $\sqrt{8} \times \sqrt{32} = \sqrt{256} = 16$
10. $\sqrt{3} \times \sqrt{27} = \sqrt{81} = 9$

Working with Exponents

Helpful Videos

Exponent Rules with Examples
https://www.youtube.com/watch?v=b4mSqcJND3I

Laws of Exponents - Basics in Simplifying Expressions
https://www.youtube.com/watch?v=FmJt_p54u04

Exercises

1. $(x^2)^3$
2. $(y^4)^2$
3. $x^5 \cdot x^3$
4. $a^6 \div a^2$
5. $(b^3)^4 \cdot b^2$
6. $(m^5)^2 \div m^3$
7. $(p^2 \cdot p^3)^2$
8. $(q^6 \div q^2)^3$
9. $(r^4 \cdot r^2) \div r^3$
10. $((s^2)^3 \cdot s^4) \div s^5$

Answers

1. $(x^2)^3 = x^{2\cdot 3} = x^6$
2. $(y^4)^2 = y^{4\cdot 2} = y^8$
3. $x^5 \cdot x^3 = x^{5+3} = x^8$
4. $a^6 \div a^2 = a^{6-2} = a^4$
5. $(b^3)^4 \cdot b^2 = b^{3\cdot 4} \cdot b^2 = b^{12+2} = b^{14}$
6. $(m^5)^2 \div m^3 = m^{5\cdot 2} \div m^3 = m^{10-3} = m^7$
7. $(p^2 \cdot p^3)^2 = (p^{2+3})^2 = (p^5)^2 = p^{10}$
8. $(q^6 \div q^2)^3 = (q^{6-2})^3 = (q^4)^3 = q^{12}$
9. $(r^4 \cdot r^2) \div r^3 = r^{4+2} \div r^3 = r^6 \div r^3 = r^3$
10. $((s^2)^3 \cdot s^4) \div s^5 = (s^6 \cdot s^4) \div s^5 = s^{10} \div s^5 = s^5$