

Hello world

$$k_{n+1} = n^2 + k_n^2 - k_{n-1} \quad (1)$$

Khan Academy Question 2 Simplify the following for h

$$S = 2\pi r(r + h) \quad (2)$$

$$S/2\pi r = r + h \quad (3)$$

$$h = (S/2\pi r) - r \quad (4)$$

$$S = 250; r = 4; h = (S/2\pi r) - r; h = 5.94718394325 \quad (5)$$

Does the following have an x-intercept?

$$f(x) = x(x + 4) \quad (6)$$

What is the rough y-intercept of

$$[-3..3]f(x) = (x + 3)(1 - x) \Rightarrow 2.8$$

The y-intercept is the value at  $f(0)$  The x-intercept is the value where  $f(x) = 0$  Periodic is a repeating or looping graph An even graph has  $f(x) = f(-x)$  or will look the same reflected over the y-axis An odd graph has  $-f(x) = f(-x)$  or will look mirrored over the x axis

What is the approximate maximum value of the formula:

$$\max(-x^2 + 6x - 1) = 8 \quad (7)$$

## 1 New section

Solve for h

$$A = 1/2(b + c)h \quad (8)$$

$$A/(1/2(b + c)) = h \quad (9)$$

$$2A/(b + c) = h \quad (10)$$

To store a variable and solve, use “st” and “=”.

For example: I want to solve

$$E/c^2$$

I type it exactly, then type my value for E, type stE, type my value for c, and type stc

## 2 New section

What is the height of a trapezoid with one base equal to 20 m, the other base equal to 7m, and an area of 135m? It is 10m.

Solve

$$m = E/(c^2)$$

for

$$c = 300,000,000m/s$$

and

$$E = 1.8e14J$$

$$m = 2e - 3$$

## 3 New section

The Area of a trapezoid is

$$A = (1/2)(b + c)h$$

solve for b

$$A/(1/2)(h) = b + c$$

$$(A/(1/2)h) - c = b$$

$$b = 2A/h - c$$

When

$$A = 80ft^2$$

$$h = 10ft$$

$$c = 5ft$$

$$b = 11$$

## 4 New section

Kinetic Energy object in motion

$$K = 1/2mv^2$$

solve for velocity v

$$m = 800$$

$$K = 100000$$

$$\text{sqrt}(2K/m)$$

$$\text{sqrt}(2100000/800) = 15.8113883008$$

## 5 New section

Net income formula is

$$NI = (SP - VC)(V) - FC$$

solve for V where

$$NI = 5000$$

$$SP = 40$$

$$VC = 15$$

$$FC = 1000$$

$$NI + FC = (SP - VC)V$$

$$V = (NI + FC)/(SP - VC)$$

$$V = (NI + FC)/(SP - VC)$$

$$= 240$$

## 6 New section

What is the y-intercept or x(0) of

$$-(x - 1)(x + 3)$$

it should be

$$3$$

## 7 New section

What is the limit as x approaches 0?

$$\lim_{x \rightarrow 0} \frac{\cos 2x - \cos 3x}{x^2}$$

Appears to be 2.5 3.99631755994

## 8 Factoring

Factoring o

$$(x + a)(x + b)$$

$$x^2 + xb + ax + ab$$

$$x^2 + (a + b)x + ab$$

Use the quadratic formula:

$$(x + a)(x + b)$$

$$x^2 + xb + ax + ab$$

$$x^2 + (a + b)x + ab$$

To factor

$$x^2 + 10x + 9$$

$$a + b = 10$$

$$ab = 9$$

Factors of 9 are 1,3,9

$$1 + 9 = 10$$

$$1 * 9 = 9$$

So

$$(x + 1)(x + 9)$$

To factor

$$x^2 - 1$$

Use Sum of cubes:

$$a^3 + b^3$$

$$(a + b)(a^2 - ab + b^2)$$

Use Difference of cubes:

$$a^3 - b^3$$

$$(a - b)(a^2 + ab + b^2)$$

To solve a division:

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

Power Rule:

$$f(x) = x^n$$

$$f'(x) = nx^{n-1}$$

## 9 Exponents

Add to combine when the terms multiply:

$$\begin{aligned}x^3 * x^4 \\ x^{3+4} \\ x^7\end{aligned}$$

Multiply when terms “compound”

$$\begin{aligned}(x^3)^4 \\ x^{3*4} \\ x^{12}\end{aligned}$$

You can separate the terms:

$$(ab)^3 = a^3b^3$$

Negative exponents are the same as a fractional positive number:

$$\begin{aligned}a^{-3} &= (1/a^3) \\ (4^{-3} * 2^{-3})^0 \\ (8^{-3})^0 \\ 8^0 \\ 1\end{aligned}$$

To find the solutions of x:

$$\begin{aligned}5x^2 + 15x - 50 &= 0 \\ 5x^2 + 15x &= 50 \\ 5(x^2 + 3x) &= 50 \\ x^2 + 3x &= 10 \\ x^2 + 3x - 10 &= 0 \\ (x + 5)(x - 2) &= 0 \\ x &= -5 \\ x &= 2\end{aligned}$$

## 10 Formal Logic

A proposition is a statement that can be true or false.

$$\bullet \neg \wedge \vee \oplus \exists \forall \quad (11)$$

## 11 Fractions

Multiplying fractions:

$$\frac{a}{b} * \frac{c}{d} = \frac{ac}{bd}$$

Dividing fractions:

$$\frac{a}{b} \div \frac{c}{d} = \frac{a}{b} * \frac{d}{c} = \frac{ad}{bc}$$

Dealing with subtracting fractions:

$$\frac{1}{a} - \frac{1}{b} = \frac{b}{ba} - \frac{a}{ba} = \frac{b-a}{ba}$$

Nested fractions:

$$\frac{\frac{1}{a} - \frac{1}{b}}{c} = \frac{b-a}{ab} * \frac{1}{c} = \frac{b-a}{abc}$$

Simplify nested fractions:

$$\frac{\frac{1}{\frac{2}{\frac{3}{4}}}}{\frac{1}{2} * \frac{4}{3}} = \frac{4}{\frac{4}{6}} = 6$$

More Nested fractions:

$$\frac{\frac{1}{b}}{\frac{1}{b} - \frac{1}{a}}$$

$$\frac{\frac{1}{b}}{\frac{a-b}{ab}}$$

$$\frac{1}{b} * \frac{ab}{a-b}$$

$$\frac{ab}{b(a-b)}$$

$$\frac{a}{a-b}$$

Simple Nested division fractions:

$$\frac{a}{y} = \frac{a}{1} * \frac{1}{y}$$

More Nested fractions:

$$\frac{\frac{2}{y} + \frac{y}{2}}{y}$$

$$\frac{\frac{4+y^2}{2y}}{y}$$

$$\frac{4+y^2}{2y} * \frac{1}{y}$$

$$\frac{4+y^2}{2y^2}$$

Exponents of fractions:

$$\frac{7^{-3}}{7^{-1}} = \frac{1}{7^2}$$

$$\frac{7^{-3}}{7^{-1}} = 7^{-2}$$

Exponents More:

$$7 * 7 * 7 * 7 * 7 = \frac{7^8}{7^3}$$

Exponents With Easy:

$$(6^3 * 6^{-3})^4$$

Add when mult

$$(6^0)^4$$

Mult when “doubling”

$$6^0$$

## 12 Expressions Structure

$$a + b = -6$$

$$x + y + z = -2$$

$$8a - 7x - 7z - 7y + 8b$$

$$8(a + b) - 7(x + y + z)$$

$$8(-6) - 7(2)$$

$$1$$

## 13 Fractional Exponents

$$x^{1/3} = \sqrt[3]{x}$$

$$x^{1/5} = \sqrt[5]{x}$$

So:

$$8^{1/3} = \sqrt[3]{8}$$

$$\sqrt[3]{8} = 2$$

Simplify

$$-8^{-\frac{1}{3}}$$

$$\frac{1}{-8^{\frac{1}{3}}}$$

$$\frac{1}{-\sqrt[3]{8}}$$

$$\frac{1}{-\sqrt[3]{8}}$$

$$\frac{1}{-2}$$

$$0.5$$

What is the value of d?

$$h^d = (h^8)^{\frac{1}{3}}$$

$$h^d = h^{\frac{8}{3}}$$

$$d = \frac{8}{3}$$

What is the value of d?

$$\sqrt[3]{k^d} = (\sqrt[3]{k})^5$$

$$\sqrt[3]{k^d} = (k^{\frac{1}{3}})^5$$

$$\sqrt[3]{k^d} = k^{\frac{5}{3}}$$



$$\sqrt[3]{k^d} = \sqrt[3]{k^5}$$

Evaluate:

$$-32^{\frac{1}{5}}$$

$$\sqrt[5]{-32}$$

$$-2$$

## 14 Roots

1. Multiplying roots:

$$\sqrt{3} * 7\sqrt{6}$$

Multiply the inner portions:

$$7\sqrt{3 * 6}$$

$$7\sqrt{18}$$

Factor out an even root

$$7\sqrt{9 * 2}$$

$$7 * 3\sqrt{2}$$

$$21\sqrt{2}$$

2. Exponent fractions

$$144^{-\frac{1}{2}}$$

$$\frac{1}{144^{\frac{1}{2}}}$$

$$\frac{1}{\sqrt[2]{144}}$$

$$\frac{1}{12}$$

## 15 Solving weird ones

$$9a + 8b + 9c = -9$$

$$81a + 72b + 81c = ?$$

$$9(9a + 8b + 9c) = 81a + 72b + 81c$$

$$9(-9) = 81a + 72b + 81c$$

$$-81 = 81a + 72b + 81c$$

## 16 Slopes

To find the slope:

$$(a, b)(x, y)$$
$$m = \frac{y - b}{x - a}$$

Point-slope:

$$y - b = m(x - a)$$

Slope intercept where y equals 0?:

$$y - b = m(x - a)$$

## 17 Factoring polynomials

$$5kp - 15kr - mp + 3mr$$
$$5k(p - 3r) - mp + 3mr$$
$$5k(p - 3r) + (-mp + 3mr)$$
$$5k(p - 3r) - (mp - 3mr)$$
$$5k(p - 3r) - m(p - 3r)$$
$$(p - 3r)(5k - m)$$

## 18 Factoring quadratics with leading coefficient not 1

$$6x^2 + 13x - 5 = 0$$

Find what a and b solve:

$$a * b = 6 * -5$$

$$a + b = 13$$

$$(a = 2, b = 15)$$

$$6x^2 - 2x + 15x - 5 = 0$$
$$(6x^2 - 2x) + (15x - 5) = 0$$
$$2x(3x - 1) + 5(3x - 1) = 0$$
$$(3x - 1)(2x + 5) = 0$$