Here are the answers to the algebra practice questions.

Solutions

1. Solve the following simultaneous equations:

The solution is **x = 2, y = -1**.

- Rearrange the second equation to make *y* the subject: $y = 2x - 5$.
- Substitute this into the first equation: $3x + 2(2x - 5) = 4$.
- Solve for *x*: $3x + 4x - 10 = 4$
  $implies 7x = 14$
  $implies x = 2$.
- Substitute $x = 2$ back into $y = 2x - 5$ to find *y*: $y = 2(2) - 5 = 4 - 5 = -1$.

2. Express as a single fraction in its simplest form:

The answer is
$frac12$.

- Invert the second fraction and multiply:
  $facx^2 - 4x + 3x^2 - 9$
  $times$
  $facx + 32x - 2$.
- Factorise each expression:
  $frac(x - 3)(x - 1)(x - 3)(x + 3)$
  $times$
  $facx + 32(x - 1)$.
- Cancel the common factors $(x - 3)$, $(x - 1)$, and $(x + 3)$ to get
  $frac12$.

3. Solve the equation $3x^2 - 7x - 5 = 0$:

[cite_start]The solutions are **x = 2.91** and **x = -0.57**. [cite: 687]

- [cite_start]Using the quadratic formula $x =$
  $frac-bpmsqrtb^2 - 4ac2a$ with $a = 3, b = -7, c = -5$. [cite: 1953]

- $x =$
  $frac7pmsqrt(-7)^2 - 4(3)(-5)2(3) =$
  $frac7pmsqrt49 + 606 =$
  $frac7pmsqrt1096.$
- x
  $approx$
  $frac7pm10.446.$
- x
  $approx2.91$ or x
  $approx - 0.57.$

4. Make *x* the subject of the formula:

The answer is $x =$
$frac3y + 1y - 2.$

- $y(x - 3) = 2x + 1$
  $impliesyx - 3y = 2x + 1.$
- Gather the *x* terms on one side: $yx - 2x = 3y + 1.$
- [cite_start]Factor out *x*: $x(y - 2) = 3y + 1.$ [cite: 493]
- Divide to solve for *x*: $x =$
  $frac3y + 1y - 2.$

5. Find their present ages:

The **father is 40 years old** and the **son is 18 years old**.

- Let the father's age be F and the son's age be S.
- Equations: $F + S = 58$ and $F + 4 = 2(S + 4).$
- From the first equation, $F = 58 - S.$
- Substitute this into the second equation: $(58 - S) + 4 = 2S + 8$
  $implies62 - S = 2S + 8$
  $implies54 = 3S$
  $impliesS = 18.$
- $F = 58 - 18 = 40.$

6. Simplify the expression:

The answer is **$16x^3$**.

- [cite_start]$(16x^8)^{frac34} = 16^{frac34}$
  $times(x^8)^{frac34} = ($
  $sqrt[4]16)^3$
  $timesx^{8timesfrac34} = 2^3$
  $timesx^6 = 8x^6$. [cite: 809, 811]
- [cite_start]$8x^6$
  $times2x^{-3} = 16x^{6-3} = 16x^3$. [cite: 803]

7. How long would it take for 6 workers?

It would take **1 hour and 20 minutes**.

- [cite_start]The relationship is $t =$
  $frackw^2$. [cite: 701]
- Substitute the known values: $3 =$
  $frack4^2$
  $implies3 =$
  $frack16$
  $impliesk = 48$.
- The formula is $t =$
  $frac48w^2$.
- For 6 workers: $t =$
  $frac486^2 =$
  $frac4836 =$
  $frac43$ hours.
- $frac43$ hours is 1 hour and
  $frac13$ of an hour, which is 20 minutes.

8. Solve the equation:

There are **no real solutions**.

- Multiply all terms by the common denominator $x(x+2)$: $5x - 3(x+2) = 1x(x+2)$.
- $5x - 3x - 6 = x^2 + 2x$

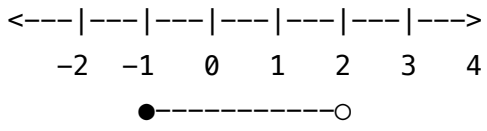
$implies 2x - 6 = x^2 + 2x.$

- $x^2 = -6$. It is not possible to find a real square root of a negative number.

9. Solve the inequality and represent the solution on a number line:

The solution is **-1 ≤ x < 3**.

- [cite_start]Add 2 to all parts of the inequality: ParseError: KaTeX parse error: Undefined control sequence: \< at position 14: -5+2 \\le 3x \< 7+2 \\implies …. [cite: 1067]
- [cite_start]Divide all parts by 3: ParseError: KaTeX parse error: Undefined control sequence: \< at position 11: -1 \\le x \< 3. [cite: 1064]
- The number line representation is:



[cite_start](A filled circle at -1 indicates it is included, and an open circle at 3 indicates it is not included). [cite: 1051, 1052, 1055]

10. Find the width of the garden:

The width of the garden is **6.25 meters**.

- Using Pythagoras' theorem: $x^2 + (x+4)^2 = 12^2$.
- $x^2 + x^2 + 8x + 16 = 144$
  $implies 2x^2 + 8x - 128 = 0.$
- Simplify by dividing by 2: $x^2 + 4x - 64 = 0.$
- Using the quadratic formula: $x =$
  $frac-4pmsqrt4^2 - 4(1)(-64)2(1) =$
  $frac-4pmsqrt16 + 2562 =$
  $frac-4pmsqrt2722.$
- Since length must be positive, we take the positive root: x
  $approx$
  $frac-4 + 16.4922$
  $approx 6.246.$
- Correct to 3 significant figures, the width is 6.25 m.