Solving Linear and Quadratic Equations

Level 1 – 2

1. Solve the following equations

   a) $3x + 2 = 8$

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   b) $7 - 2y = -1$

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   c) $4a + 1 = 3a - 5$

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2. The length of one side of a square is equal to L. The area of the square is 49 cm^2.

   a) Use this information to write down an equation involving L.

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   b) Solve the equation.

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3. Solve the following equations

   a) $\dfrac{b}{2} + 1 = 9$

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   b) $\dfrac{3}{x} = 5$

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4. The formula for converting degrees Celsius C to Kelvin K is $K = C + 273.15$.

a) Convert $0°C$ to Kelvin ....

b) Convert $-20°C$ to Kelvin ....

c) Convert 376 K to $°C$ ....

d) *Absolute zero* is equal to 0 K. Calculate the value of absolute zero in $°C$.

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Level 3 – 4

5. Solve the following equations

a) $x^2 + 5x - 6 = 0$ ....

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b) $y^2 - y - 6 = 0$ ....

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c) $a^2 + 12a + 27 = 0$ ....

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d) $2x^2 + 9x - 5 = 0$ ....

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e) $c^2 + 5c = 14$

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f) $3x^2 + 7x + 3 = x^2$

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6. The sum of four consecutive integers is 46. Let x represent the value of the smallest integer.

a) Write down an equation involving x.

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b) Solve the equation.

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c) The sum of three consecutive even integers is 66. Construct an equation and then solve it to determine the value of the smallest integer.

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Level 5 – 6

7. The sum of three consecutive square numbers is 110. Construct and equation and then solve it to determine the value of the largest square number.

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8. Solve the equation $2x + 3 = \dfrac{14}{x}$.

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9. In 2010 Peter was 12 years older than Mike.

a) Use this information to write down an equation involving Peter's age p and Mike's age m.

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b) Write down an expression in terms of p for Peter's age in 2012.

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c) Write down an expression in terms of m for Mike's age in 2012.

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In 2012 Peter was twice as old as Mike.

d) Use this information to write down a new equation involving Peter's age p and Mike's age m.

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e) Use your answers to a) and d) to determine Peter and Mike's age in 2010.

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10. Solve the equation $x + 4 = \dfrac{13x + 4}{x + 3}$.

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11. If a number increases by 5 the square of the number increases by 125. Let x represent the value of the original number.

a) Write down an equation involving x

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b) Solve the equation to determine the value of x.

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12. If $y = 3x - 1$ and $2y - 3 = 2x + 3$ determine the values of x and y.

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13. A ladder of length 10 m is resting against a wall. The foot of the ladder is pushed 2 m closer to the wall resulting in the ladder reaching a further 2 m up the wall.

Let x represent the distance between the foot of the ladder and the wall before it is pushed closer. Let y represent the distance the ladder reaches up the wall before it is pushed closer.

a) Draw and label a diagram of the ladder before it is pushed closer to the wall.

b) Use your diagram to write down an equation involving x and y.

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c) Draw and label a diagram of the ladder after it is pushed closer to the wall.

d) Use your diagram to write down an equation involving x and y.

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e) Solve your equations to determine the values of x and y.

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14. a) Fill in the missing values

$$x^2 + 6x + 1 = (x + \text{.........})^2 - 8$$

b) **Hence** solve the equation $x^2 + 6x + 1 = 0$. Write your answer in simplest radical form.

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c) Use the same method to solve $x^2 - 8x + 10 = 0$

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d) Use a similar method to solve $2x^2 + 4x - 3 = 0$.

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15. If the length of two parallel sides of a square are increased by 2 cm the area increases by 8 cm^2.
Determine the length of one side of the original square.

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