Solving Linear Equations in Context

For each problem, define a variable, form a linear equation, and solve it to find the value. Show all your working.

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1. I think of a number, multiply it by 4, and then subtract 9. The result is 31. What is the number?

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2. A pen costs $1.50 more than a pencil. If I buy 5 pencils and the total cost is $7.50, what is the cost of one pencil?

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3. Sarah is twice as old as her brother, Tom. The sum of their ages is 27. How old is Tom?

4. A concert ticket costs p dollars. A booking fee of $5 is added to the total order.

i) Write an expression for the cost of buying 4 tickets.

ii) If the total cost for 4 tickets is $325, form and solve an equation to find the price of one ticket.

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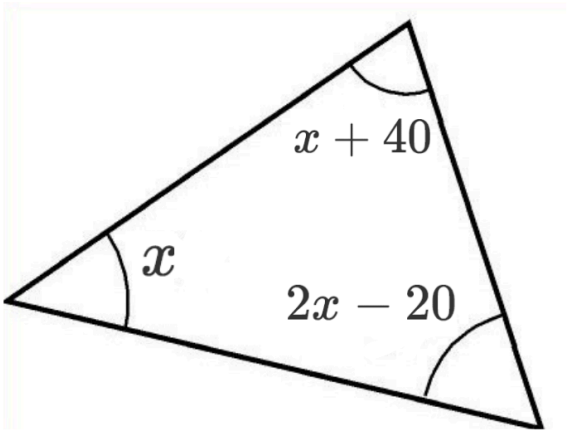
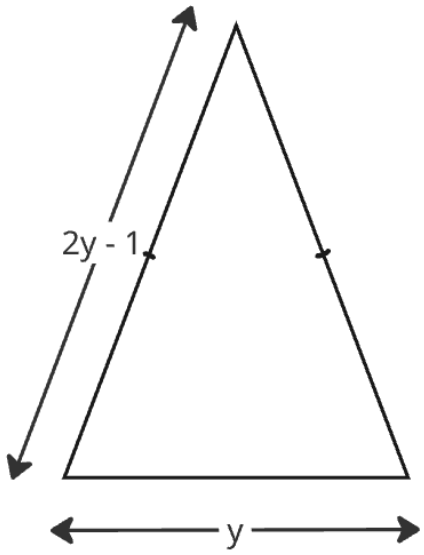
5. **Temperature:** To convert Celsius (C) to Fahrenheit (F), you can use the formula $F = 1.8C + 32$. What temperature in Celsius is equivalent to $77^\circ F$?

6. A rectangle has a length that is 5 cm longer than its width, w. The perimeter of the rectangle is 58 cm. Find its width.

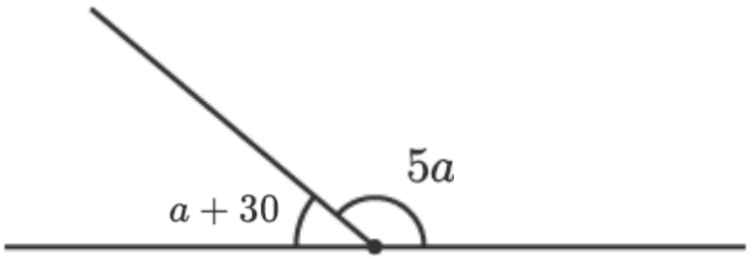
7. The angles in a triangle are x, $x + 40$, and $2x - 20$ degrees. Find the size of the smallest angle.



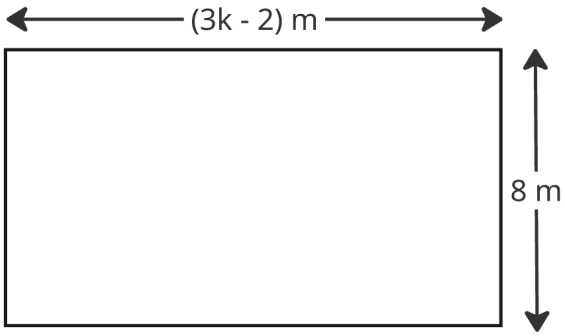
8. An isosceles triangle has two sides of length $2y - 1$ cm and a base of length y cm. Its perimeter is 47 cm. Find the length of the base.



9. Two angles on a straight line are $5a$ and $a + 30$ degrees. Find the value of a.



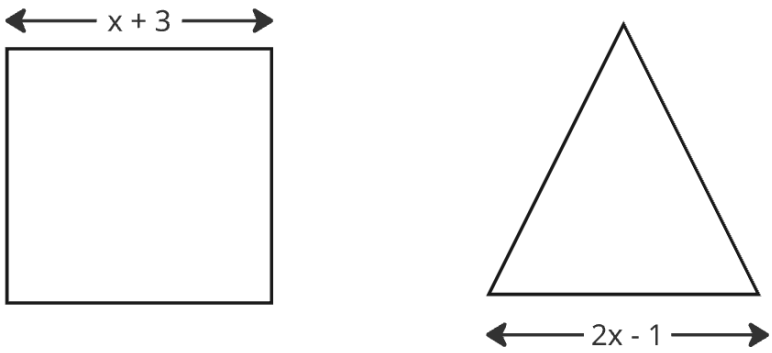
10. **Rectangle Area:** A rectangle has a width of 8 m and a length of $3k - 2$ m.



i) Write an expression for the area of the rectangle.

ii) If the area is 88 m², solve an equation to find the value of k.

11. **Two Shapes, Same Perimeter:** A square with side length $x + 3$ has the same perimeter as an equilateral triangle with side length $2x - 1$.



i) Write an expression for the perimeter of the square.

ii) Write an expression for the perimeter of the triangle.

iii) Form and solve an equation to find the value of x.

12. The sum of three consecutive even numbers is 102. Find the largest of the three numbers. (Hint: Let the first even number be n).

13. **Phone Plans:** Plan A costs $40 per month plus $0.10 for every text. Plan B costs $30 per month plus $0.15 for every text.

i) Write an expression for the monthly cost of each plan if t texts are sent.

ii) How many texts would you have to send for the monthly cost to be exactly the same for both plans?

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14. A father is currently 3 times as old as his son. In 14 years, the father will be twice as old as his son. How old is the son now?

15. A number is added to the numerator of the fraction $\frac{3}{8}$ and the same number is subtracted from the denominator. The new fraction is equivalent to $\frac{2}{3}$. Find the number.