Year 7 Algebra - Practice Test 1

18 questions | 40 marks

Equivalent correct methods and notation earn corresponding marks. Include units and directions where asked. Each worked step identifies the mark allocation.

1. Solve $x + 7 = 15$. [1 mark]

Subtract 7: $x = 15 - 7 = 8$. (1 mark)

Answer: $x = 8$

2. Solve $x - 6 = 9$. [1 mark]

Add 6: $x = 9 + 6 = 15$. (1 mark)

Answer: $x = 15$

3. Solve $3x = 18$. [1 mark]

Divide by 3: $x = 18 \div 3 = 6$. (1 mark)

Answer: $x = 6$

4. Solve $\frac{x}{4} = 5$. [1 mark]

Multiply by 4: $x = 5 \times 4 = 20$. (1 mark)

Answer: $x = 20$

5. Solve $2x + 3 = 17$. Show your steps. Then put your answer back into the equation to check it. [3 marks]

Subtract 3 from both sides: $2x = 14$. (1 mark)

Divide both sides by 2: $x = 7$. (1 mark)

Check: $2 \times 7 + 3 = 17$. Both sides match. (1 mark)

Answer: $x = 7$

6. Solve $3x - 4 = 20$. Show your steps. Then put your answer back into the equation to check it. [3 marks]

Add 4 to both sides: $3x = 24$. (1 mark)

Divide both sides by 3: $x = 8$. (1 mark)

Check: $3 \times 8 - 4 = 20$. Both sides match. (1 mark)

Answer: $x = 8$

7. Find the value of $2r + s$ when $r = 4$ and $s = 3$. Show your working. [2 marks]

Replace the letters: $2 \times 4 + 3$. (1 mark)

Calculate $8 + 3 = 11$. (1 mark)

Answer: 11

8. Find the value of $3(a + 2)$ when $a = 5$. Show your working. [2 marks]

Replace a with 5: $3(5 + 2)$. (1 mark)

Work out the brackets first: $3 \times 7 = 21$. (1 mark)

Answer: 21

9. Write an expression for each. [2 marks]

(a) Multiply x by 3, then subtract 7.

(b) Add t and 5, then divide the total by 2.

(a) Multiply x by 3 and subtract 7: $3x - 7$. (1 mark)

(b) Add first, then divide the whole sum: $\frac{t+5}{2}$. (1 mark)

Answer:

(a) $3x - 7$.

(b) $\frac{t+5}{2}$.

10. A notebook costs n dollars. A pen costs 3 dollars. Each set has one notebook and one pen. [3 marks]

(a) Write an expression for the cost of one set.

(b) Write an expression for the cost of 4 sets.

(c) Explain why both costs must be multiplied by 4.

(a) Add the two item costs: $n + 3$. (1 mark)

(b) Multiply the cost of one set by 4: $4(n + 3)$. (1 mark)

(c) Each set has both items, so both the notebook cost and the pen cost are paid 4 times. (1 mark)

Answer:

(a) $n + 3$ dollars.

(b) $4(n + 3)$ dollars.

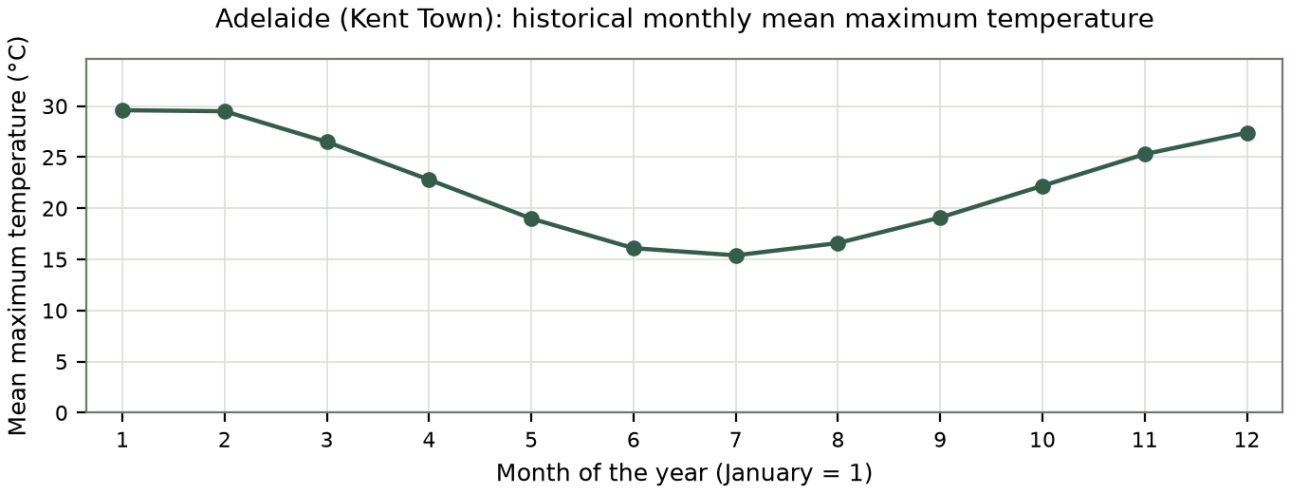
(c) Each set has both items, so both costs are paid 4 times.

11. A museum visit costs $C = 4n + 3$ dollars for n students. Find the cost for 6 students. Show your working. [2 marks]

Replace n with 6: $C = 4 \times 6 + 3$. (1 mark)

Calculate $C = 24 + 3 = 27$. The cost is 27 dollars. (1 mark)

Answer: The visit costs 27 dollars.



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12. Use the graph. Some values are January 29.6 °C, April 22.8 °C, July 15.4 °C and October 22.2 °C. [3 marks]

(a) What does the horizontal axis show?

(b) What does the vertical axis show? Include the unit.

(c) Which month has the lowest value? Give its temperature.

(a) The horizontal axis shows the month. January is 1. (1 mark)

(b) The vertical axis shows the average daily high temperature in degrees Celsius. (1 mark)

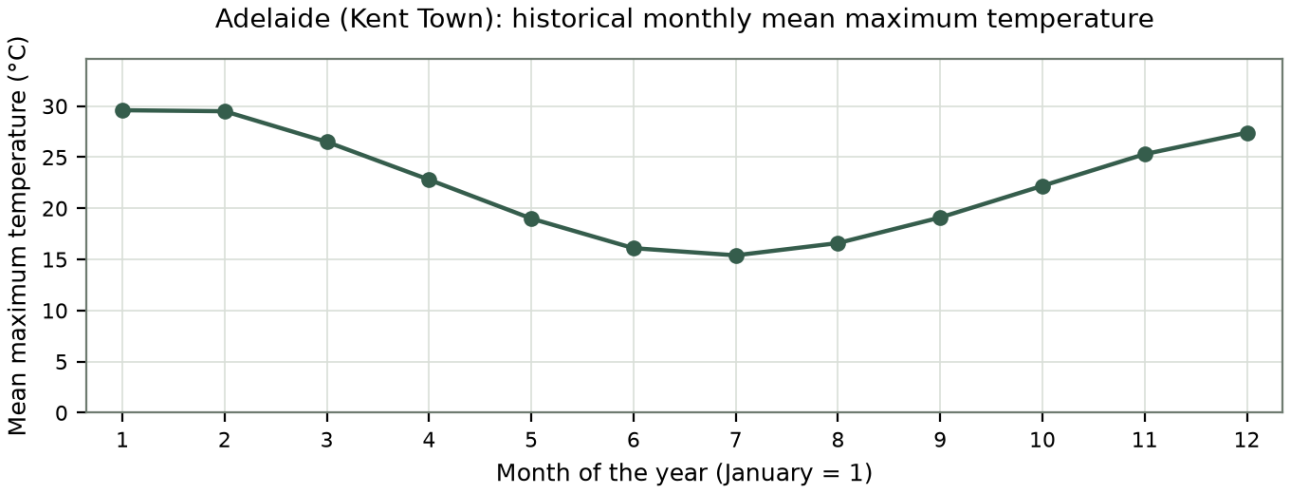
(c) July has the lowest plotted value: 15.4 °C. (1 mark)

Answer:

(a) The month, with January numbered 1.

(b) The average daily high temperature in °C.

(c) July, 15.4 °C.



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13. Use the same graph. [3 marks]

(a) Does the temperature rise or fall from January to July? What about July to October?

(b) Find the drop from January to July. Show your working.

(c) Can this graph tell you the highest temperature on one day next July? Explain why or why not.

(a) The values fall from January to July, then rise from July to October. (1 mark)

(b) The drop is $29.6 - 15.4 = 14.2$ °C. (1 mark)

(c) The values are monthly averages from past years. They cannot tell us the temperature on one future day. (1 mark)

Answer:

(a) It falls from January to July, then rises from July to October.

(b) 14.2 °C.

(c) No. The graph shows monthly averages from past years, not the temperature on one future day.

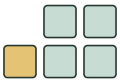
14. The tile pattern is shown below. Let n be the stage number and T the number of tiles. [3 marks]

Stage 1



3 tiles

Stage 2



5 tiles

Stage 3



7 tiles

(a) Fill the gaps: $n: 1, 2, 3, 4$; $T: 3, \square, \square, \square$.

(b) Write a rule linking T and n.

(c) How many tiles are at stage 12? Use your rule.

(a) Add 2 each time: the missing values are 5, 7 and 9. (1 mark)

(b) The rule is $T = 2n + 1$. (1 mark)

(c) At stage 12, $T = 2 \times 12 + 1 = 25$ tiles. (1 mark)

Answer:

(a) $T: 3, 5, 7, 9$.

(b) $T = 2n + 1$.

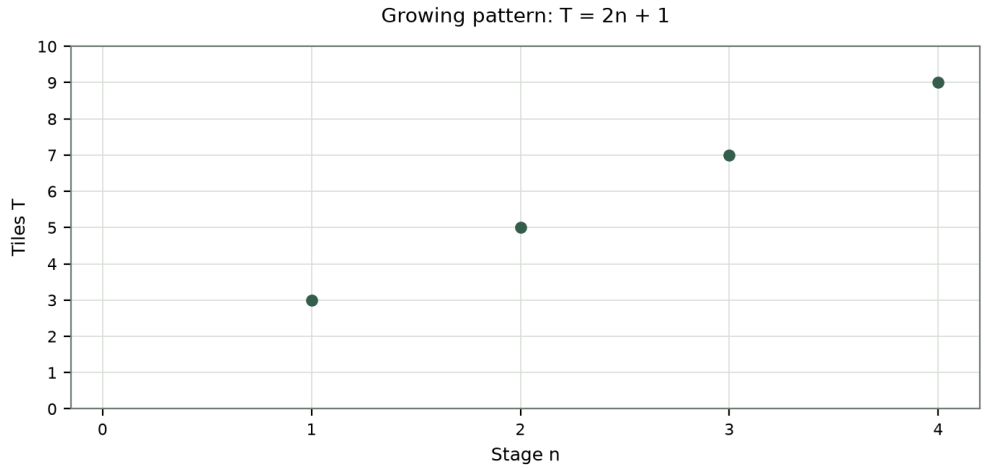
(c) 25 tiles.

15. Use the grid to plot $T = 2n + 1$ for $n = 1, 2, 3, 4$. Label the horizontal axis n (stage) and the vertical axis T (tiles). Number both axes clearly. Plot four separate points. Do not join them. [2 marks]

Label the axes n (stage) and T (tiles), with clear, evenly spaced numbers. (1 mark)

Plot $(1, 3)$, $(2, 5)$, $(3, 7)$ and $(4, 9)$ as separate points. Do not join them. (1 mark)

Answer: A labelled graph with separate points $(1, 3)$, $(2, 5)$, $(3, 7)$ and $(4, 9)$.



16. A shop sells ribbon using the rule $C = 2l + 1$. Here l is the length in metres and C is the cost in dollars, including a fixed fee. You may buy part of a metre. [4 marks]

(a) Make a table of C for $l = 0, 1, 2, 3, 4$.

Substitute into $C = 2l + 1$: the costs are $1, 3, 5, 7, 9$ dollars. (1 mark)

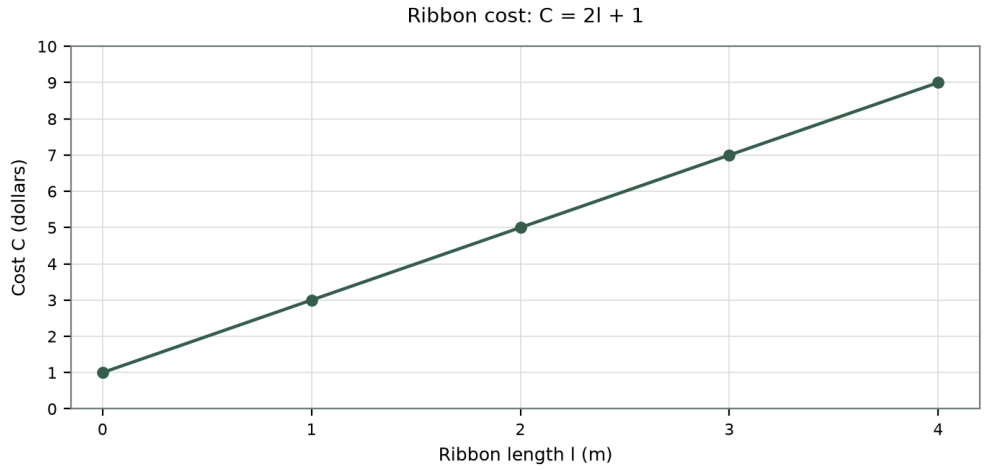
Answer: $(l, C) : (0, 1), (1, 3), (2, 5), (3, 7), (4, 9)$.

(b) Plot the points on the grid. Label and number both axes, then use a ruler to join the points with a straight line.

Label length l in metres on the horizontal axis and cost C in dollars on the vertical axis. Number both axes using clear, even scales. (1 mark)

Plot $(0, 1), (1, 3), (2, 5), (3, 7), (4, 9)$ correctly and join them with a straight line. Lengths between whole metres are allowed. (1 mark)

Answer: A labelled straight line through those five points.



(c) Use your graph to find the cost of 2.5 metres.

Read $C = 6$ when $l = 2.5$. The cost is 6 dollars. (1 mark)

Answer: 6 dollars.

17. The cost formula is $C = pn + f$. Here p is the price of one item, n is the number of items and f is a fee paid once. All costs are in dollars. Use $p = 4$ and $f = 3$. [2 marks]

(a) Find C for $n = 1, 2, 3$. Make a table with columns n, p, f, C.

(b) How much does the cost rise for each extra item? Explain why.

(a) Use $C = 4n + 3$ to find and record $(1, 4, 3, 7)$, $(2, 4, 3, 11)$ and $(3, 4, 3, 15)$. (1 mark)

(b) Each extra item adds 4 dollars. The price per item is 4 dollars and the fixed fee stays at 3 dollars. (1 mark)

Answer:

(a) The rows (n, p, f, C) are $(1, 4, 3, 7)$, $(2, 4, 3, 11)$ and $(3, 4, 3, 15)$.

(b) Each extra item adds 4 dollars because each item costs 4 dollars and the fee stays the same.

18. Use $C = pn + f$, with $n = 3$ and $f = 2$. [2 marks]

(a) Find the cost when $p = 2$ and when $p = 4$. Show your working.

(b) How much does the cost rise? Explain why.

(a) When $p = 2$, $C = 2 \times 3 + 2 = 8$. When $p = 4$, $C = 4 \times 3 + 2 = 14$. (1 mark)

(b) The rise is $14 - 8 = 6$ dollars. Each of 3 items costs 2 dollars more: $3 \times 2 = 6$. The fee stays the same. (1 mark)

Answer:

(a) 8 dollars and 14 dollars.

(b) The rise is 6 dollars. Each of the 3 items costs 2 dollars more.

Curriculum alignment

Australian Curriculum, presented by QCAA | 9.0 | AC9M7A01, AC9M7A02, AC9M7A03, AC9M7A04, AC9M7A05, AC9M7A06

Original written topic review across substitution, expressions, equations, authentic graphs, patterns and controlled formula comparisons.

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