Year 7 Algebra - Practice Test 3

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 $x + 9 = 21$. [1 mark]

Subtract 9: $x = 21 - 9 = 12$. (1 mark)

Answer: $x = 12$

2. Solve $x - 8 = 14$. [1 mark]

Add 8: $x = 14 + 8 = 22$. (1 mark)

Answer: $x = 22$

3. Solve $5x = 35$. [1 mark]

Divide by 5: $x = 35 \div 5 = 7$. (1 mark)

Answer: $x = 7$

4. Solve $\frac{x}{6} = 4$. [1 mark]

Multiply by 6: $x = 4 \times 6 = 24$. (1 mark)

Answer: $x = 24$

5. Solve $4x + 3 = 31$. Show your steps. Check by putting your answer back into the equation. [3 marks]

Subtract 3 from both sides: $4x = 28$. (1 mark)

Divide both sides by 4: $x = 7$. (1 mark)

Check: $4 \times 7 + 3 = 28 + 3 = 31$. Both sides match. (1 mark)

Answer: $x = 7$

6. Solve $3x - 5 = 22$. Show your steps. Check by putting your answer back into the equation. [3 marks]

Add 5 to both sides: $3x = 27$. (1 mark)

Divide both sides by 3: $x = 9$. (1 mark)

Check: $3 \times 9 - 5 = 27 - 5 = 22$. Both sides match. (1 mark)

Answer: $x = 9$

7. Find $3a + 2b$ when $a = 2$ and $b = 5$. Show your working. [2 marks]

Replace the letters: $3 \times 2 + 2 \times 5$. (1 mark)

Work out $6 + 10 = 16$. (1 mark)

Answer: 16

8. Find $4(t + 3)$ when $t = 2$. Show your working. [2 marks]

Replace t with 2: $4(2 + 3)$. (1 mark)

Work out the brackets first: $4 \times 5 = 20$. (1 mark)

Answer: 20

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

(a) Multiply k by 6, then add 2.

(b) Add m and 9, then divide the total by 3.

(a) Multiply first, then add: $6k + 2$. (1 mark)

(b) Divide the whole sum: $\frac{m+9}{3}$. (1 mark)

Answer:

(a) $6k + 2$.

(b) $\frac{m+9}{3}$.

10. A ticket costs t dollars. A badge costs 2 dollars. Each pack has one ticket and one badge. [3 marks]

(a) Write the cost of one pack.

(b) Write the cost of 3 packs.

(c) Explain why both item costs must be multiplied by 3.

(a) Add the item costs: $t + 2$. (1 mark)

(b) Multiply the whole pack cost by 3: $3(t + 2)$. (1 mark)

(c) Both the ticket and badge are in every pack, so both costs are paid 3 times. (1 mark)

Answer:

(a) $t + 2$ dollars.

(b) $3(t + 2)$ dollars.

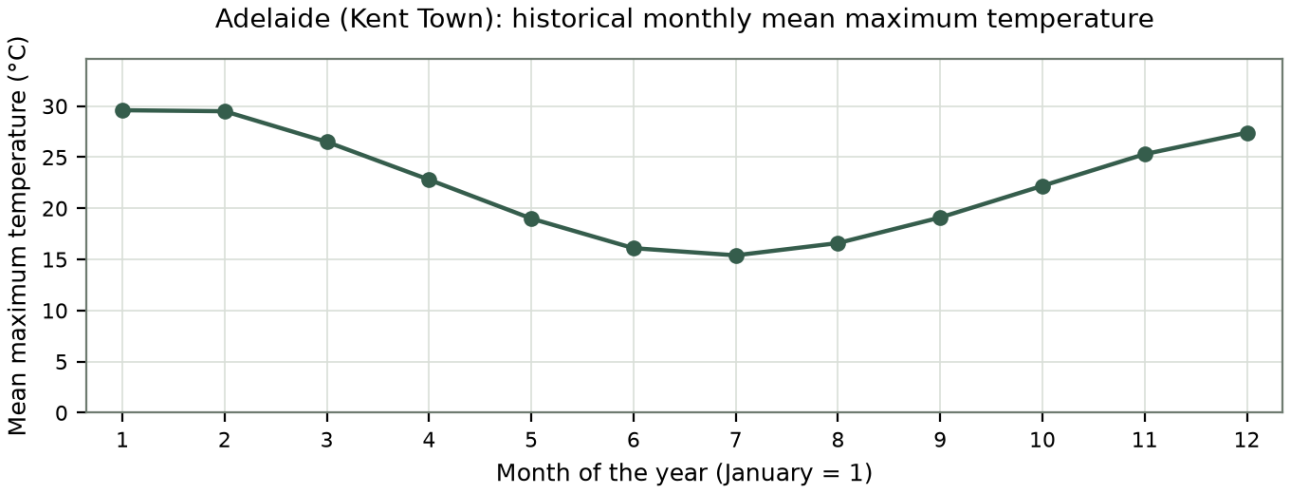
(c) Each of the 3 packs has both items, so both costs are paid 3 times.

11. A swimming club charges 2 dollars per visit and a fee of 5 dollars paid once. The cost formula is $C = 2v + 5$, where v is the number of visits. Find the cost of 6 visits. Show your working. [2 marks]

Replace v with 6: $C = 2 \times 6 + 5$. (1 mark)

The cost is $C = 12 + 5 = 17$ dollars. (1 mark)

Answer: 17 dollars.



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12. Use the graph. Some values are February 29.5 °C, July 15.4 °C, November 25.3 °C and December 27.4 °C. [3 marks]

(a) What does the horizontal axis show?

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

(c) Look at July to December. Which month has the highest 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)

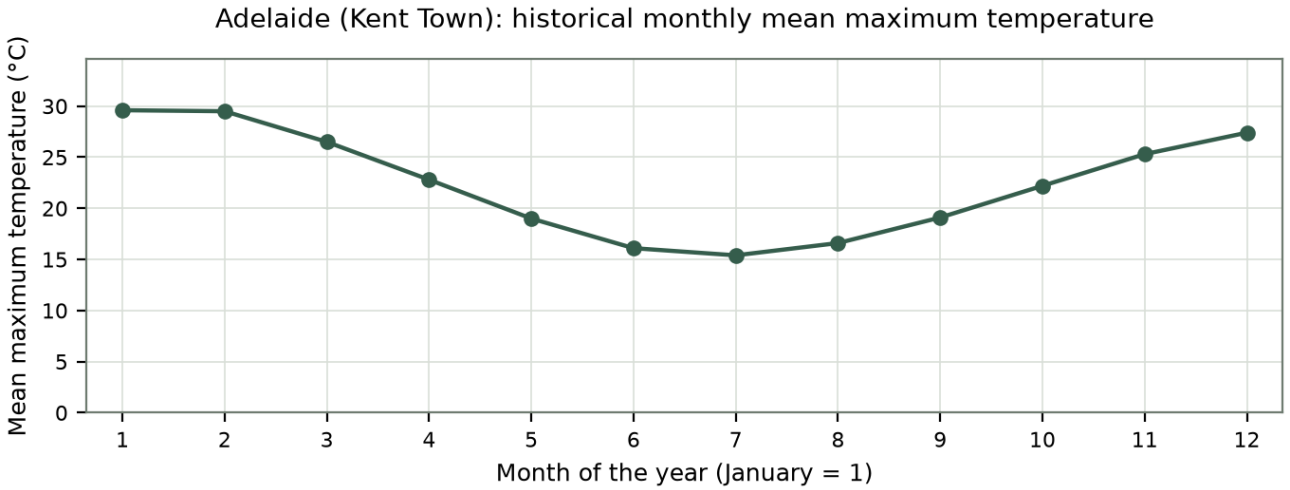
(c) From July to December, December has the highest value: 27.4 °C. (1 mark)

Answer:

(a) The month, with January numbered 1.

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

(c) December, 27.4 °C.



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13. Use the same graph. [3 marks]

(a) Do the values rise or fall from February to July? What about July to November?

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

(c) Can the graph tell you the highest temperature on one day next July? Explain.

(a) The values fall from February to July, then rise from July to November. (1 mark)

(b) The drop is $29.5 - 15.4 = 14.1$ °C. (1 mark)

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

Answer:

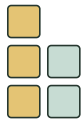
(a) They fall from February to July, then rise from July to November.

(b) 14.1 °C.

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

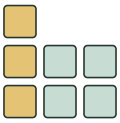
14. Stage 1 has 5 tiles. Each new stage adds 2 tiles. Let n be the stage number and T the number of tiles. [3 marks]

Stage 1



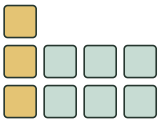
5 tiles

Stage 2



7 tiles

Stage 3



9 tiles

(a) Fill the gaps: $n: 1, 2, 3, 4$; $T: 5, \square, \square, \square$.

(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 7, 9 and 11. (1 mark)

(b) The rule is $T = 2n + 3$. (1 mark)

(c) At stage 12, $T = 2 \times 12 + 3 = 27$ tiles. (1 mark)

Answer:

(a) $T: 5, 7, 9, 11$.

(b) $T = 2n + 3$.

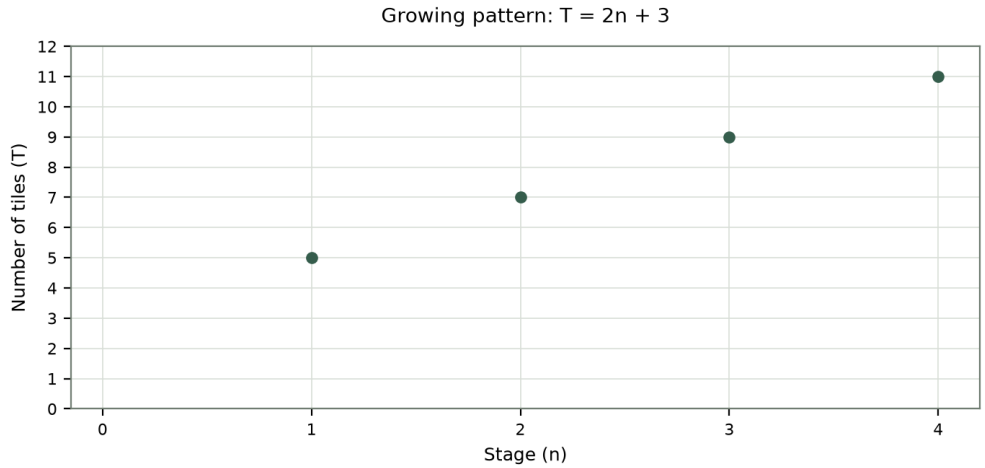
(c) 27 tiles.

15. Use the grid to plot $T = 2n + 3$ 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 $(1, 5)$, $(2, 7)$, $(3, 9)$ and $(4, 11)$ as separate points. Do not join them. (1 mark)

Answer: A labelled graph with separate points $(1, 5)$, $(2, 7)$, $(3, 9)$ and $(4, 11)$.



16. Ribbon costs $C = 2l + 3$ dollars for l metres. You can buy any length, including part of a metre. [4 marks]

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

Substitute each length into $C = 2l + 3$: the table is $(0, 3)$, $(1, 5)$, $(2, 7)$, $(3, 9)$ and $(4, 11)$. (1 mark)

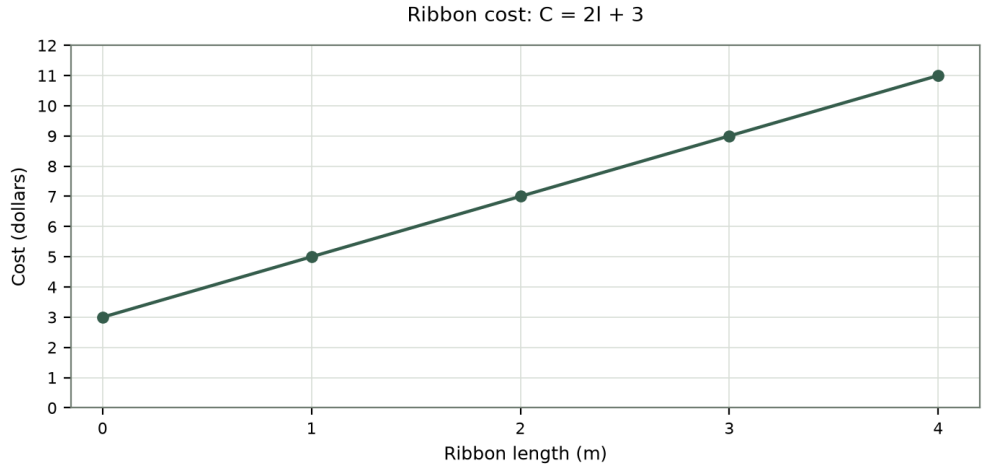
Answer: The costs are $3, 5, 7, 9, 11$ dollars.

(b) Plot your table on the grid. Label both axes with units. Join the points with a straight line using a ruler.

Label the horizontal axis length in metres and the vertical axis cost in dollars, with clear, evenly spaced numbers. (1 mark)

Plot all five points correctly and join them with a straight line using a ruler. Lengths between the plotted values are allowed. (1 mark)

Answer: A straight line through $(0, 3)$, $(1, 5)$, $(2, 7)$, $(3, 9)$ and $(4, 11)$.



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

The line gives 8 dollars at 2.5 metres; check $2 \times 2.5 + 3 = 8$. (1 mark)

Answer: 8 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 $p = 3$ and $f = 4$. [2 marks]

(a) Find C for $n = 1, 2, 3$. Make a table of n and C. Show one calculation.

(b) How much does each extra item add to the cost? Explain why.

(a) Use $C = 3n + 4$: the pairs are $(1, 7)$, $(2, 10)$ and $(3, 13)$. For example, $3 \times 2 + 4 = 10$. (1 mark)

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

Answer:

(a) The pairs (n, C) are $(1, 7)$, $(2, 10)$ and $(3, 13)$.

(b) Each extra item adds 3 dollars because each item costs 3 dollars and the fee stays the same.

18. Use $C = pn + f$, with $n = 4$ and $f = 1$. [2 marks]

(a) Find the cost when $p = 2$ and when $p = 5$. Show your working.

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

(a) When $p = 2$, $C = 2 \times 4 + 1 = 9$. When $p = 5$, $C = 5 \times 4 + 1 = 21$. (1 mark)

(b) The rise is $21 - 9 = 12$ dollars. Each of 4 items costs 3 dollars more: $4 \times 3 = 12$. The fee stays the same. (1 mark)

Answer:

(a) 9 dollars and 21 dollars.

(b) The rise is 12 dollars. Each of the 4 items costs 3 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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