Practice Unit Assessment (2) for National 5 Relationships

1. A straight line with gradient 4 passes through the point (2, –4).

Determine the equation of this straight line.

2. Solve the inequation $7m + 5 < 2m + 30$.

3. The Clelland family visit a new attraction in Inverness. They paid £29.40 for 2 adult tickets and 4 child tickets.

Write an equation to represent this information.

4. Solve the following system of equations algebraically:

$$\begin{aligned} 7x + 2y &= 32 \\ 2x - y &= 6 \end{aligned}$$

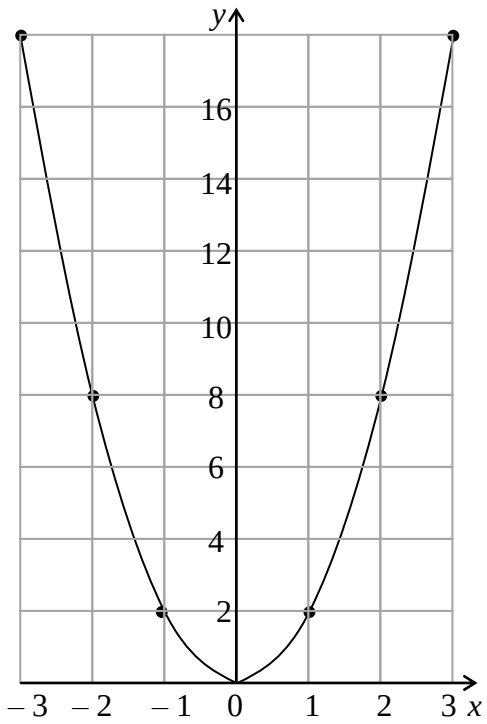
5. Here is a formula

$$A = \frac{4B}{5} - 2$$

Change the subject of the formula to B.

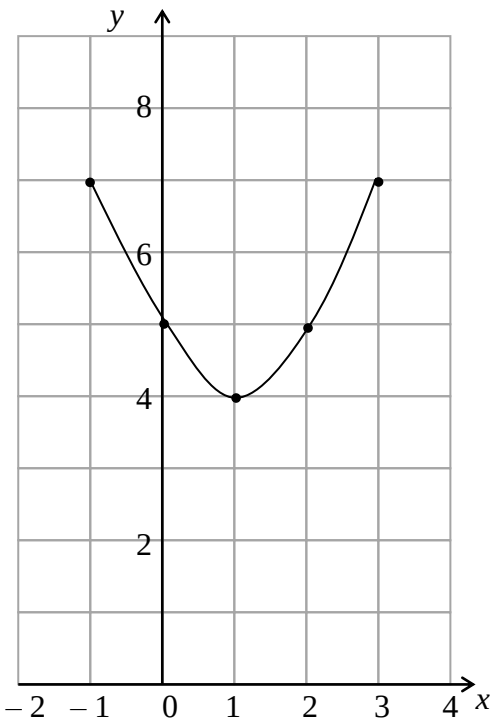
6. The diagram shows the parabola with equation $y = kx^2$.

What is the value of k?



7. The equation of the quadratic function whose graph is shown below is of the form $y = (x + a)^2 + b$, where a and b are integers.

Write down the values of a and b.



8. Sketch the graph $y = (x – 5)(x – 7)$ on plain paper.

Mark clearly where the graph crosses the axes and state the coordinates of the turning point.

9. A parabola has equation $y = (x + 4)^2 – 3$.

(a) Write down the equation of its axis of symmetry.

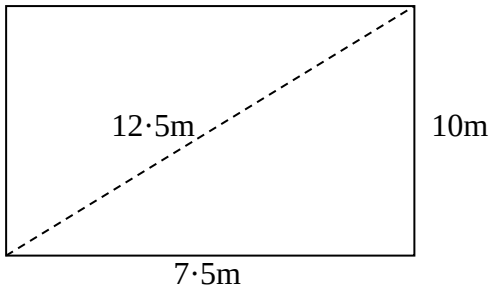
(b) Write down the coordinates of the turning point on the parabola and state whether it is a maximum or minimum.

10. Solve the equation $(x – 10)(x + 5) = 0$

11. Solve the equation $x^2 – 3x – 2 = 0$ using the quadratic formula.

12. Determine the nature of the roots of the equation $4x^2 + 3x + 5 = 0$ using the discriminant.

13. A shape has dimensions as shown in the diagram.

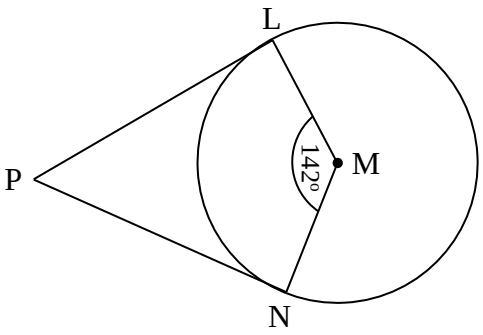


Kalen thinks it is a rectangle. Is he correct?

14. The diagram shows kite PNML and a circle with centre M.

PL is the tangent to the circle at L and PN is the tangent to the circle at N.

Given that angle LMN is 142°, calculate angle LPN.



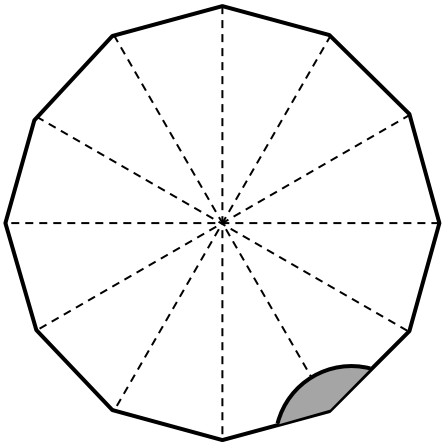
15. A cuboid has length 30 cm and a volume of 1500 cm³

A similar miniature version is 10 cm long.

Calculate the volume of the miniature cuboid.

.

16. Here is a regular, 12 – sided polygon.



Calculate the size of the shaded angle.

17. Sketch the graph of $y = 7\cos x^{o}$ for $0^{\circ} \leq x \leq 360^{\circ}$.

18. Write down the period of the graph of the equation $y = \sin 5x^{o}$.

19. Solve the equation $7\cos x^{\circ} - 2 = 0$, $0^{\circ} \leq x \leq 360^{\circ}$.

End of Question Paper

Practice Unit Assessment (2) for Relationships: Marking Scheme

Points of reasoning are marked # in the table.

Question	Main points of expected responses	
1	•[1] correct substitution	•[1] $y + 4 = 4(x - -2)$ (or equivalent)
2	•[1] simplify for m •[2] simplify numbers •[3] solve	•[1] $5m$ •[2] 25 •[3] $m < 5$
3	#2.1 uses correct strategy and sets up equation	#2.1 $2a + 4c = 29 \cdot 4$
4	•[1] multiply by appropriate factor •[2] solve for x •[3] solve for y	•[1] $7x + 2y = 32$ $4x - 2y = 12$ or equivalent •[2] $x = 4$ •[3] $y = 2$
5	•[1] add 2 •[2] multiply by 5 •[3] divide by 4	•[1] $A + 2$ •[2] $(A + 2) \times 5$ (or equivalent) •[3] $\frac{5(A+2)}{4}$ (or equivalent)
6	•[1] correct value of k	•[1] $k = 2$
7	•[1] find value of 'a' •[2] find value of 'b'	•[1] $a = -1$ •[2] $b = 4$
8	•[1] identify and annotate roots and y-intercept •[2] identify and annotate turning point •[3] draw correct shape of graph	•[1] 5, 7 and (0, 35) •[2] (6, –1) •[3] correctly annotated graph
9 (a) **(b)**	•[1] axis of symmetry •[2] turning point •[3] nature	•[1] $x = -4$ •[2] (–4, –3) •[3] minimum turning point
10	•[1] solve equation	•[1] $x = -5$, $x = 10$
11	•[1] correct substitution	•[1] $\frac{3 \pm \sqrt{3^2 - 4 \times 1 \times -2}}{2}$

		•^{2} 17 •^{3} $x = 3{\cdot}6$ •^{4} $x = -0{\cdot}6$ (rounding not required)
12	•^{1} correct substitution •^{2} evaluate discriminant #2.2 interpret result	•^{1} $(3)^2 - 4 \times 4 \times 5$ •^{2} -71 #2.2 roots are not real since $b^2 - 4ac < 0$
13	•^{1} calculates and adds squares of two short sides •^{2} squares longest side #2.2 interprets result	•^{1} $7{\cdot}5^2 + 10^2 = 156{\cdot}25$ •^{2} $12{\cdot}5^2 = 156{\cdot}25$ #2.2 so $7{\cdot}5^2 + 10^2 = 12{\cdot}5^2$ and hence triangle is right-angled using converse of Pythagoras. The shape is a rectangle
14	•^{1} radius and tangent •^{2} subtract •^{3} correct answer	•^{1} either angle PLM or angle MNP = 90° •^{2} $360 - (90 + 90 + 142)$ •^{3} 38°
15	•^{1} use volume scale factor •^{2} correct answer	•^{1} $(10/30)^3 \times 15000$ •^{2} $55{\cdot}6$ cm^3
16	#2.1 use a valid strategy •^{1} correct answer	#2.1 eg centre angles 360/12 = 30° each •^{1} 150°
17	•^{1} correct amplitude and period •^{2} correctly annotated graph complete with roots and amplitude.	•^{1} 7 / – 7 and 360° •^{2} Correct graph
18	•^{1} correct period	•^{1} 72°
19	•^{1} solve for cos x° •^{2} solve for x •^{3} complete solution	•^{1} cos x° = 2/7 •^{2} $73{\cdot}4$° •^{3} $286{\cdot}6$°