

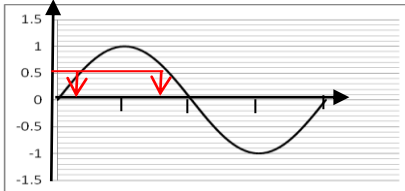
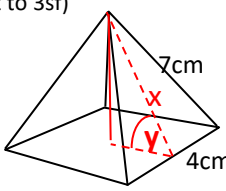
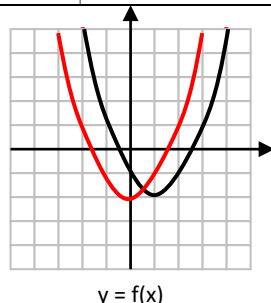
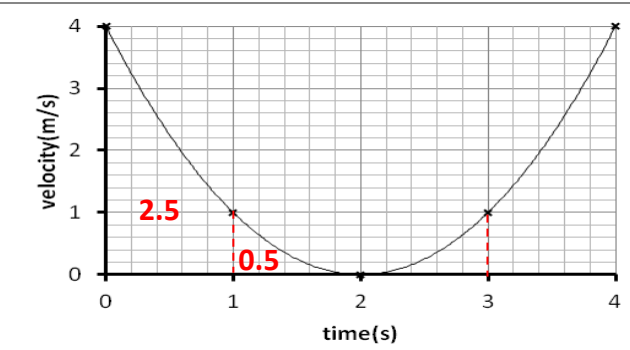
Maths Key Skills

Name:

Date:

Stage 11: Skill Check 3 Answers

Class/Group:

A: Number & Algebra		B: Algebra, Proportion, Geometry & Measure		C: Geometry & Measure & Statistics	
1. Simplify: $2\sqrt{3} \times \sqrt{3}$	11:1 6	11. Make (p) the new subject of: $4(p+3) = q(1-p)$	$4p+12=q-qp$ $4p+qp=q-12$ $p(4+q)=q-12$ $p = \frac{q-12}{4+q}$	21. Work out the angle that base makes with the sloping face. (correct to 3sf)	11:26 Calculator icon 72.7°
2. Rationalise & simplify: $\frac{4}{3-\sqrt{2}}$	11:2 $\frac{12+4\sqrt{2}}{7}$	12. This is the graph of $y = \sin x$ Give two solutions for $\sin x = 0.5$		11:14 30° 150°	 $x = \sqrt{7^2 - 2^2} = \sqrt{45}$ $\cos y = \frac{2}{\sqrt{45}} = 0.298\dots$ $y = 72.7^\circ$
3. If $x=4.62$ (2dp) and $y=2.5$ (1dp) Work out maximum value of $x \div y$ correct to 1dp	11:3 Calculator icon $4.625 \div 2.45 = 1.887\dots$ =1.9	13. Sketch on the grid: $y = f(x+1)$		11:15	
4. Simplify the following fraction: $\frac{m^2 - 4m - 21}{6m + 18}$	11:4 $\frac{(m-7)(m+3)}{6(m+3)} = \frac{(m-7)}{6}$	14. Estimate the total distance travelled.		11:16 6m	Calculator icon $y = 13$ $\frac{\sin 42}{\sin 52} = \frac{13 \sin 42}{\sin 52}$ $= 11.038\dots$ 11.0cm
5. Solve: $\frac{1}{x-2} + \frac{2}{x+4} = \frac{1}{3}$	11:5 $x = 8$ or -1	15. Write down the equation of the tangent at (-6,-8) on the circle $x^2+y^2 = 100$	$m_{\text{radius}} = \frac{-8-0}{-6-0} = \frac{4}{3}$ $m_{\text{tangent}} = -\frac{3}{4} : y = -\frac{3}{4}x + c$ $(-6,-8) : -8 = -\frac{3}{4}(-6) + c ; c = -25/2$ Equation of tangent: $y = -\frac{3}{4}x - 25/2$ or $4y + 3x + 50 = 0$	11:18	23. Work out the size of angle A (3sf)
	$x+4+2x-4 = 1$ $(x-2)(x+4) = 3$ $3(3x) = x^2+2x-8$ $x^2-7x-8 = 0$ $(x-8)(x+1) = 0$ $x = 8$ or -1				Calculator icon $\cos A = \frac{2.8^2 + 4.5^2 - 4.1^2}{2 \times 2.8 \times 4.5}$ $\cos A = 0.44761\dots$ $\angle A = 63.4^\circ$ 63.4°

6. If $f(x) = x^2 - 4x$ and $g(x) = x+1$ work out: $f(g(x))$

11:7
 $x^2 - 2x - 3$

$$\begin{aligned} (x+1)^2 - 4(x+1) \\ x^2 + 2x + 1 - 4x - 4 \\ = x^2 - 2x - 3 \end{aligned}$$

7. Find the turning point of:
 $y = x^2 + 3x - 5$

11:8
 $(-1.5, -7.25)$

$$\begin{aligned} (x+1.5)^2 - 2.25 - 5 \\ (x+1.5)^2 - 7.25 \end{aligned}$$

8. Solve by completing the square:
 $x^2 - 4x + 1 = 0$
(Write down the EXACT values)

11:9
 $x = 2 \pm \sqrt{3}$

$$\begin{aligned} (x-2)^2 - 4 + 1 = 0 \\ (x-2)^2 - 3 = 0 \\ (x-2)^2 = 3 \end{aligned}$$

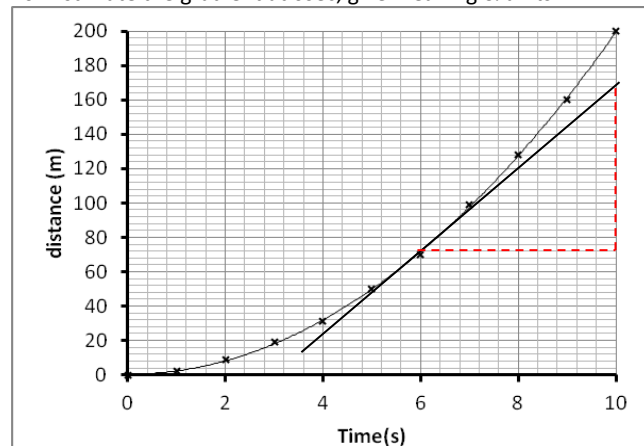
9. To solve: $3x^2 + 2x = 2$ by formula, substitute the appropriate values.

11:10
 $-2 \pm \sqrt{28}$
6

10. Write down the solution set for: $(x+2)(x-7) > 0$

11:11
 $\{x: x < -2 \text{ or } x > 7\}$

16. Estimate the gradient at 6sec, give meaning & units



11:20

Average speed at 6s
 $\approx 95 \div 4$
 $\approx 24 \text{m/s}$

24. If $\overrightarrow{PQ} = -\frac{1}{2}\underline{a} + \frac{1}{2}\underline{b}$

and
 $\overrightarrow{QR} = \frac{1}{2}(-3\underline{a} + \underline{b}) + \underline{b}$

Rearrange the vectors to demonstrate clearly that P, Q & R are in a straight line

$$\begin{aligned} \overrightarrow{PQ} &= -\frac{1}{2}\underline{a} + \frac{1}{2}\underline{b} = \frac{1}{2}(\underline{b} - \underline{a}) \\ \overrightarrow{QR} &= \frac{1}{2}(-3\underline{a} + \underline{b}) + \underline{b} \\ &= -\frac{3}{2}\underline{a} + \frac{3}{2}\underline{b} \\ &= \frac{3}{2}(\underline{b} - \underline{a}) \end{aligned}$$

11:29

Same vector (different lengths) so parallel

Common letter so P, Q & R are collinear

8. Solve by completing the square:
 $x^2 - 4x + 1 = 0$
(Write down the EXACT values)

11:9
 $x = 2 \pm \sqrt{3}$

$$\begin{aligned} (x-2)^2 - 4 + 1 = 0 \\ (x-2)^2 - 3 = 0 \\ (x-2)^2 = 3 \end{aligned}$$

17. $x^3 + 3x - 7 = 0$ can be solved using the iteration

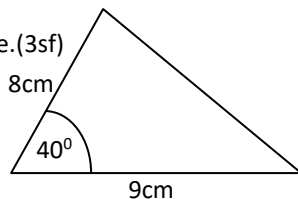
formula: $x_{n+1} = \sqrt[3]{7 - 3x_n}$

Start with $x_1 = 1$ and work out an approximation for x by finding x_5 to 2 decimal places

11:21

1.42

18. Work out the area of this triangle. (3sf)

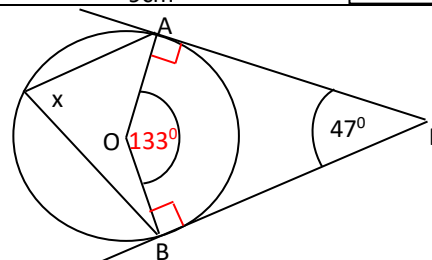


$$0.5 \times 8 \times 9 \sin 40 = 23.140\dots$$

11:22

23.1cm²

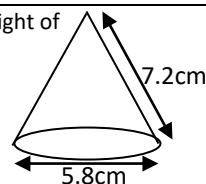
19. O is the centre. Work out angle x.



11:23

66.5°

20. Work out the perpendicular height of the cone. (1dp)



$$\sqrt{7.2^2 - 2.9^2} = 6.590\dots$$

11:24

6.6cm

25. Complete the table:

Height(hcm)	Frequency	Frequency Density
65 < h ≤ 75	2	2 ÷ 10 = 0.2
75 < h ≤ 80	7	7 ÷ 5 = 1.4
80 < h ≤ 90	21	21 ÷ 10 = 2.1
90 < h ≤ 105	15	15 ÷ 15 = 1
105 < h ≤ 110	12	12 ÷ 5 = 2.4

11:30

Total (A)

Total (B)

Total (C)

Test Total (A+B+C)

R (0-9)

Y (10-19)

G (20-25)