This is a calculator test (50 minutes).

The following marks are awarded for each question.

B	Unconditional accuracy mark
M	Method mark – the correct method must be shown but there may be an arithmetic error; the sight of the value given in brackets implies the award of the method mark
A	Accuracy mark – unless the question specifies that working **must** be shown then the sight of the correct answer implies the award of full marks (unless the answer clearly comes from incorrect working)
C	Communication mark
P	Process mark to show correct process for problem solving. Any other process of a similar standard to achieve an accurate result is acceptable to achieve this mark
FT	Incorrect values may be **followed through** from one step to the next **provided** that the correct method is seen in each step and the only errors are arithmetic. This is shown in mark schemes by putting a number in inverted commas
OE	Or equivalent answer mark

Q	Answer	Mark	Comment
1	$V = 30$	P1	$12 = 0.04k$ or $V = kc$
		P1	$k = 300$ or $V = 300c$ or $V = 300 \times 0.1$
		A1	
3	$q = \pm 32$	P1	$24 = \dfrac{k}{16^2}$ or $p = \dfrac{k}{q^2}$
		P1	$k = 6144$ or $p = \dfrac{6144}{q^2}$ or $6 = \dfrac{6144}{q^2}$ or $q^2 = \dfrac{6144}{6}$
		A1	accept $q = \pm\sqrt{\dfrac{6144}{6}}$ or 32 or -32

5	2.6 to 3.5	M1	tangent to the curve drawn at $x = 3$
		M1	gind gradient to their tangent, e.g. gradient $= \dfrac{10-1}{5-2} = \dfrac{9}{3} = 3$
		A1	answer in the range of 2.6 to 3.5

| 7a | 0.25 OE, 1, 2, 4 | B2 | B2 for all four correct; B1 for two or three correct |
| 7b | Correct graph drawn from $(-2, 0.25)$ to $(3, 8)$ | M1 | at least five points plotted correctly from their table |

9a	38	M1	for starting to find the area under the curve or heights of trapezia given: 0, 1, 3, 7.5, 15
		M1	for method to find the area under the curve between $t = 0$ and $t = 8$ or at least two areas shown: 1, 4, 10.5, 22.5
		A1	
9b	Overestimate with reason	C1	e.g. area between the trapeziums and the curve is also included

11a	$(90, 0)$	B1	accept $\left(\dfrac{\pi}{2}, 0 \right)$
11b	$(180, -1)$	B1	accept $(\pi, -1)$
11c	$p = -90$	B1	accept -90 or 270
	$q = 2$	B1	
13	$(2, -4)$	B2	B1 for $(2, y)$ or $(x, -4)$ or 'translation 5 left' **and** 'reflection in the x-axis'

Question	Topic	Step	Marks
1	Calculate an unknown quantity from quantities that vary in direct or inverse proportion	10th	3
3	Solve problems involving inverse proportionality, including problems where y is inversely proportional to the square of x	10th	3
5	Interpret the gradient of linear or non-linear graphs, and estimate the gradient of a quadratic or non-linear graph at a given point by sketching the tangent and finding its gradient	12th	3
7a	Plot graphs of exponential functions in the form $y = a^x$ for integer values of x and simple positive values of a	10th	2
7b	Plot graphs of the exponential function $y = k^x$ for integer values of x and simple positive values of k	11th	2
9a	Estimate area under a quadratic graph by dividing it into trapezia	12th	3
9b	Know if the estimate under a quadratic graph is an over-estimate or under-estimate	12th	1

Question	Topic	Step	Marks
11a	Recognise, sketch and interpret graphs of trigonometric functions (in degrees) for sin, cos and tan within the range −360° to +360°	12th	1
11b	Recognise, sketch and interpret graphs of trigonometric functions (in degrees) for sin, cos and tan within the range −360° to +360°	12th	1
11c	Apply to the graph of $y = f(x)$ the transformations $y = f(x) + a$, $y = f(ax)$, $y = f(x + a)$ and $y = af(x)$ for linear, quadratic, cubic, sine and cosine functions of x	12th	2
13	Apply to the graph of $y = f(x)$ the transformations $y = –f(x)$, $y = f(–x)$ and $y = −f(–x)$ for linear, quadratic, cubic, sine and cosine functions	12th	2