## Question 1

Solve the inequality $25 - 3x < 7$.

*Answer* ..... [2]

## Question 2

Solve the simultaneous equations $3x + 4y = 27$,
$4x - 2y = 25$.

*Answer* $x =$ .....

$y =$ ..... [3]

## Question 3

Make $y$ the subject of the formula $x = \frac{4 + \sqrt{y}}{3}$.

*Answer* $y =$ ..... [3]

## Question 4

Simplify $\frac{4x-3}{8} - \frac{3x-4}{12}$.

*Answer* ..... [3]

## Question 5

Simplify $\frac{ax-ay}{px-py+qx-qy}$.

*Answer* ..... [3]

## Question 6

**(a)** **(i)** Expand $(x^2-1)(x^2+1)$.

*Answer (a)*(i) ..... [1]

**(ii)** Factorise $x^2-1$.

*Answer (a)*(ii) ..... [1]

**(b)** $9999 = 10^4 - 1$. Write 9999 as a product of prime factors.

*Answer (b)* 9999 = ..... [2]

## Question 7

Solve the equation $x^2 - 2x - 5 = 0$, giving your answers correct to 2 decimal places.
Show all your working.

*Answer* $x =$ ..... or ..... [4]

## Question 8

$f: x \mapsto 3 - 2x$ and $g: x \mapsto \frac{x+1}{4}$, for all values of $x$.

**(a)** Find $f(-\frac{3}{4})$.

*Answer (a)* ..... [1]

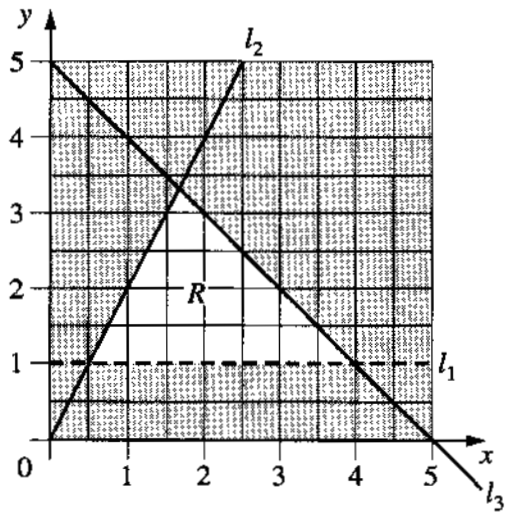
**(b)** Find the inverse function, $g^{-1}(x)$.

*Answer (b)* $g^{-1}(x) =$ ..... [2]

**(c)** Find the composite function, $fg(x)$, giving your answer as a single fraction.

*Answer (c)* $fg(x) =$ ..... [2]

## Question 9




**(a)** Find the equations of the lines $l_1$, $l_2$ and $l_3$.

*Answer (a)* $l_1$: .....

$l_2$: .....

$l_3$: ..... [3]

**(b)** The unshaded region, labelled $R$, is defined by three inequalities.
Write down these three inequalities.

*Answer (b)* .....

.....

.....[2]

## Question 10

**Answer the whole of this question on a sheet of graph paper.**

The equation $h = 20t - 5t^2 + 1$ gives the height $h$ metres above ground level of a stone $t$ seconds after it has been thrown vertically upwards. Some values of $h$ and $t$ are given in the following table.

| $t$ | 0 | 0.5 | 1 | 1.5 | 2 | 2.5 | 3 | 3.5 | 4 | 4.5 |
|---|---|---|---|---|---|---|---|---|---|---|
| $h$ | 1 | 9.75 | 16 | 19.75 | 21 | $a$ | 16 | 9.75 | $b$ | $c$ |

**(a)** Calculate the values of $a$, $b$ and $c$. [3]

**(b)** Using a scale of 2 cm to represent 0.5 seconds on the horizontal $t$-axis and 2 cm to represent 4 m on the vertical $h$-axis, draw the graph of $h = 20t - 5t^2 + 1$ for $0 \leqslant t \leqslant 4.5$. [5]

**(c) Use your graph to answer these questions.**

**(i)** What is the value of $t$ when the stone reaches ground level? [1]

**(ii)** For how long is the stone more than 12 m above the ground?
Give your answer in seconds to 1 decimal place. [2]

**(iii)** How far does the stone travel **altogether** in the first 3 seconds? [2]

**(d) (i)** Draw a suitable tangent on your graph and use it to calculate an estimate of the gradient (slope) when $t = 1$. [3]

**(ii)** What quantity does the gradient measure and what are the units for this quantity? [2]

| QUESTION | ANSWER | MARK | |
|---|---|---|---|
| 1 | $x > 6$ | 2 | (M1) for $18 < 3x$ **or** $-3x < -18$ |
| 2 | $x = 7$ ; $y = 1\frac{1}{2}$ | 3 | (M1) for any complete correct method<br>(A1) for one correct answer |
| 3 | $y = (3x - 4)^2$ | 3 | (M1) for correct multiplication by 3<br>(M1) for correct subtraction of 4 if first M1 awarded |
| 4 | $\frac{6x - 1}{24}$ | 3 | (M1) for common denominator 24k (where k is an integer)<br>(A1) for 6kx **or** -1k (same k as above) |
| 5 | $\frac{a}{p + q}$ | 3 | (B1) for $a(x - y)$<br>(B1) for $p(x - y) + q(x - y)$ |
| 6 (a)(i) | $x^4 - 1$ | 1 | |
| (a)(ii) | $(x + 1)(x - 1)$ | 1 | |
| (b) | 3 x 3 x 11 x 101 | 2 | (SC1) for correct partial factorisation (at least 3 terms) |
| 7 | -1.45, 3.45 | 4 | (B1) for $\sqrt{24}$ **or** (B2) for $\frac{2 \pm \sqrt{24}}{2}$<br>Alt. method: (B1) for $(x - 1)^2 - 6 = 0$ **or** (B2) for $x = 1 \pm \sqrt{6}$<br>(SC2) for 1.45, -3.45 (sign error) **or** (SC3) for a rounding error |
| 8 (a) | $4\frac{1}{2}$ | 1 | Allow $\frac{9}{2}$ |
| (b) | $4x - 1$ | 2 | (M1) for $4y - 1$ seen in correct method |
| (c) | $\frac{5 - x}{2}$ | 2 | (M1) for $3 - \frac{2(x + 1)}{4}$ |
| 9 (a) | y = 1, y = 2x, x + y = 5 | 1,1,1 | Correct answers only |
| (b) | $y > 1$, $y \leq 2x$, $x + y \leq 5$ | 2 | (B1) for 2 correct anwers |
| 10 (a) | 19.75, 1, -10.25 | 3 | (B1) for each correct answer |
| (b) | Scales correct<br>10 correct points<br>Reasonable curve drawn | 1<br>3<br>1 | (P2) for 8 or 9 points correct, (P1) for 6 or 7 points correct |
| (c)(i) | 4.05 | 1 | Allow [4.0 < t < 4.1] |
| (c)(ii) | 2.7 | 2 | (B1) for [0.6 < t < 0.7]<br>(B1) for [3.3 < t < 3.4] |
| (c)(iii) | 25 | 2 | (B1) for 21 – 1 = 20 (distance travelled to highest point)<br>(B1) for 21 – 16 = 5 (distance travelled from highest point) |
| (d)(i) | Tangent drawn at (1, 16)<br>Gradient = 10 | 1<br>2 | (M1) for a (reasonably generous) chord, e.g. allow slight space<br>(M1) for 'his' (vertical ÷ horizontal) only if scale used correctly |
| (d)(ii) | Speed, m/s | 1,1 | |

## TYPES OF MARK

Most of the marks (those without prefixes and 'B' marks) are given for accurate results, drawings or statements.
'M' marks are awarded for any correct method applied to the appropriate numbers.
'B' marks are given for a correct statement or step.
'A' marks are for accurate results or statements but are awarded only if the relevant 'M' marks have been earned.
'SC' marks are awarded in special cases.
The symbol '√' indicates that a previous error is to be 'followed through' i.e. the mark can be gained if the candidate has made no further error in obtaining the relevant result.