

Sec 4 Maths D

Date

1/8/02

No

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Topic 28: Graph

1a $y = (x+k)(2-x)$

$A(0, 8) \Rightarrow 8 = 2k$

$k = 4$

b When $y = 0$, $x = -k = -4$ or $x = 2$.

Coordinates of B are $(-4, 0)$.

c The line of symmetry is $x = -1$

d Area of $\triangle ABC = \frac{1}{2}(6)(8)$

$= 24 \text{ units}^2$

2 $y = mx + c$

a $m = \frac{8}{6} = \frac{4}{3}$

$A(6, 0) \Rightarrow 0 = 6(\frac{4}{3}) + c$

$c = -8$

b $AB = \sqrt{6^2 + 8^2} = 10 \text{ units}$

c $y = (x+k)(x-6)$

$C(0, 5) \Rightarrow 5 = -6k$

$k = -\frac{5}{6}$

d The line of symmetry is $x = (6 - \frac{5}{6}) \div 2$

$x = 2\frac{7}{12}$

3 $y = (2x+3)(3x-8)$

a When $x = 0$, $y = -24$.

When $y = 0$, $x = -\frac{3}{2}$ or $x = \frac{8}{3}$.

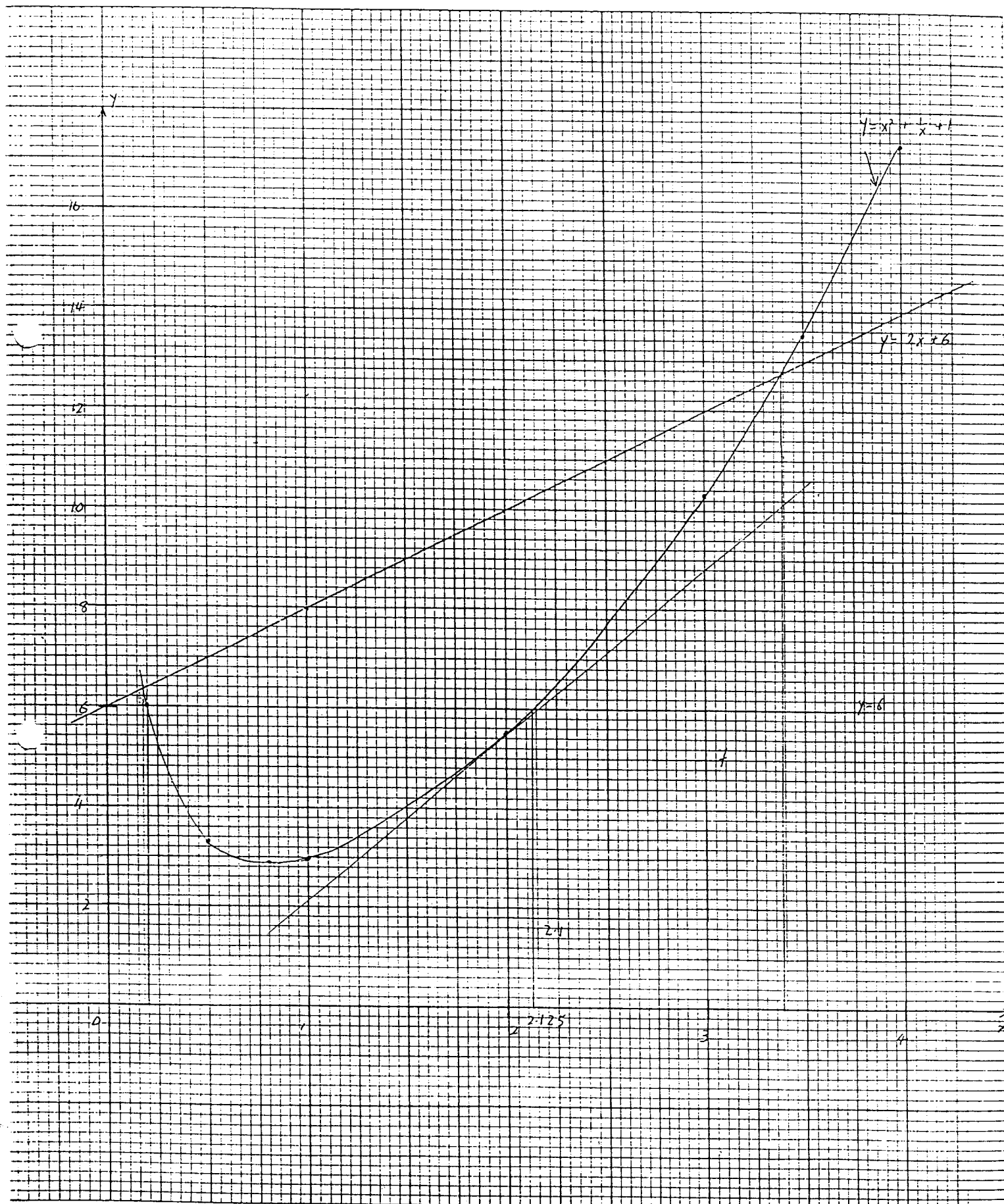
$\therefore A(-\frac{3}{2}, 0)$, $B(\frac{8}{3}, 0)$

b The line of symmetry is $x = (-\frac{3}{2} + \frac{8}{3}) \div 2$

$x = \frac{7}{12}$

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4. $y = x^2 + \frac{1}{x} + 1$

(a) When $x = 0.8$, $y = 0.8^2 + \frac{1}{0.8} + 1$

$= 2.9$ (1 d.p.)

$a = 2.9$

When $x = 3.5$, $y = 3.5^2 + \frac{1}{3.5} + 1$

$= 13.5$ (1 d.p.)

$b = 13.5$

(c) $x^2 + \frac{1}{x} \leq 5$

$x^2 + \frac{1}{x} + 1 \leq 6$

Draw $y = 6$.

$0.2 \leq x \leq 2.125$

(d) $x^3 - 2x^2 - 5x + 1 = 0$

$x(x^2 - 2x - 5 + \frac{1}{x}) = 0$

$x^2 - 2x - 5 + \frac{1}{x} = 0$

$x^2 + \frac{1}{x} + 1 = 2x + 6$

Draw $y = 2x + 6$.

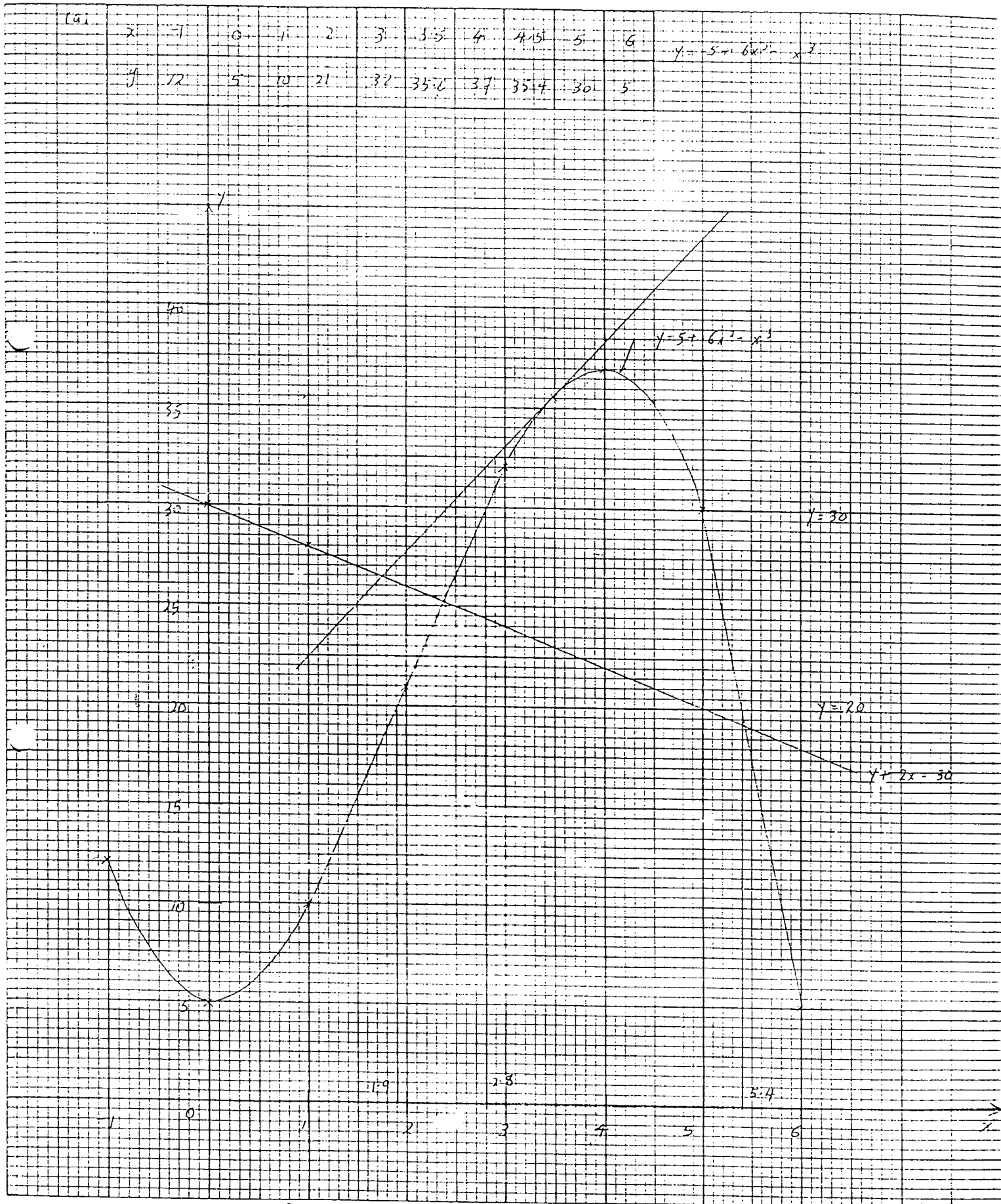
$x = 3.4$, $x = 0.18$

(e) Gradient $= \frac{7}{21}$

$= 3.33$ (3 s.f.)

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(c) (i) $5 + 6x^2 - x^3 = 20$ for $0 \leq x \leq 6$

Draw $y = 20$.

$\therefore x = 1.9$ or $x = 5.4$

(ii) $6x^2 - x^3 = 25$ for $-1 \leq x \leq 6$

$5 + 6x^2 - x^3 = 30$

Draw $y = 30$.

$\therefore x = 2.8$ or $x = 5$

(d) $(2.4, 25.2)$ and $(5.4, 19.2)$

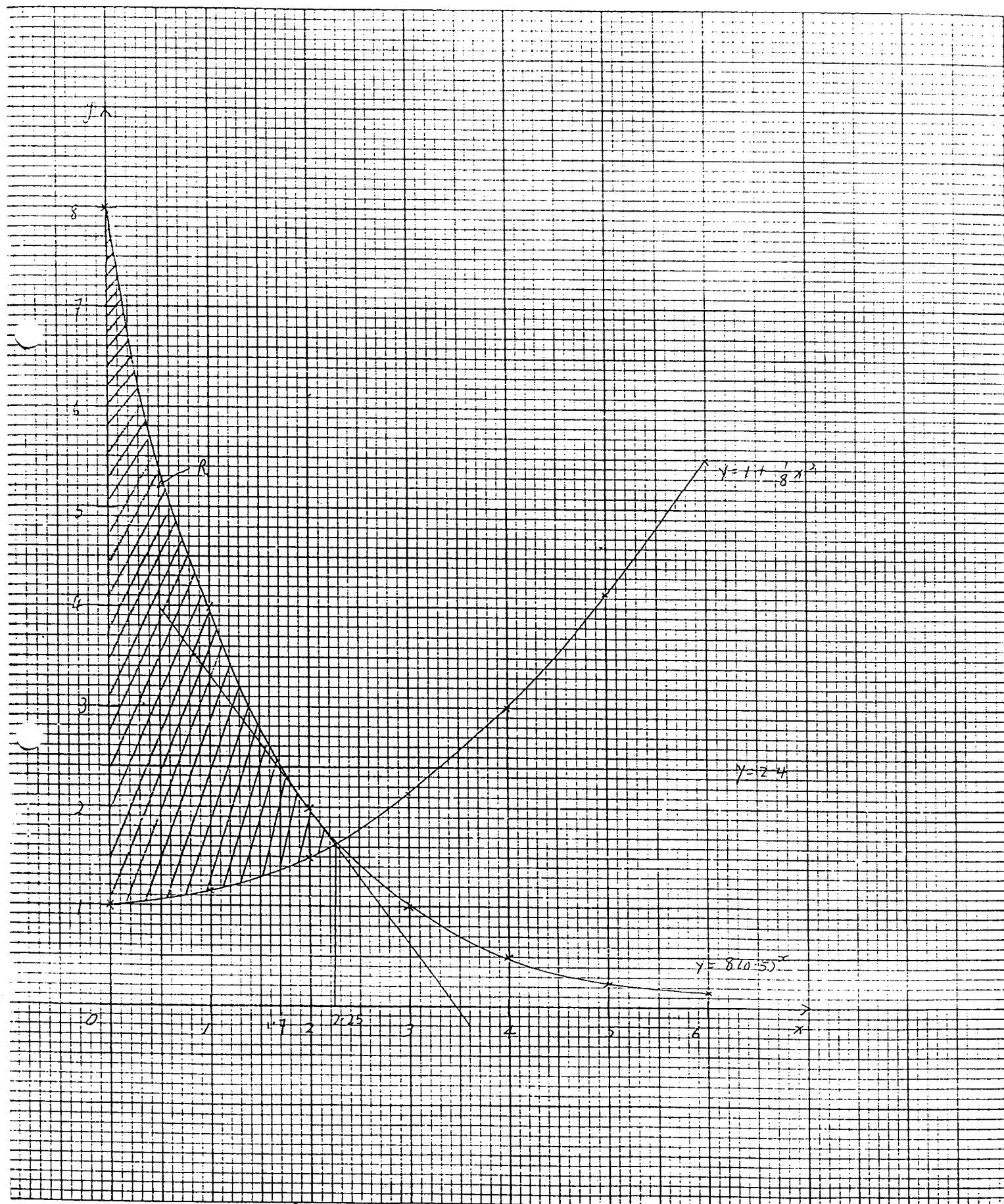
(e) Gradient $= \frac{21}{4}$
 $= 5.25$

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$$(a) y = 1 + \frac{1}{8}x^2$$

$$\begin{aligned} \text{When } x = 2, y &= 1 + \frac{1}{8}(4) \\ &= 1\frac{1}{2} \end{aligned}$$

$$\therefore p = 1\frac{1}{2}$$

$$\begin{aligned} \text{When } x = 6, y &= 1 + \frac{1}{8}(36) \\ &= 5\frac{1}{2} \end{aligned}$$

$$\therefore q = 5\frac{1}{2}$$

$$y = 8(0.5)^x$$

$$\begin{aligned} \text{When } x = 2, y &= 8\left(\frac{1}{5}\right)^2 \\ &= 2 \end{aligned}$$

$$\therefore r = 2$$

$$\begin{aligned} \text{When } x = 5, y &= 8\left(\frac{1}{5}\right)^5 \\ &= \frac{1}{4} \end{aligned}$$

$$\therefore s = \frac{1}{4}$$

$$(c) x = 2.25$$

$$(d) (0.5)^x = 0.3$$

$$8(0.5)^x = 2.4$$

$$\text{Draw } y = 2.4.$$

$$\therefore x = 1.7$$

$$(e) \text{ Gradient} = \frac{3.5}{2.6} = 1.35$$

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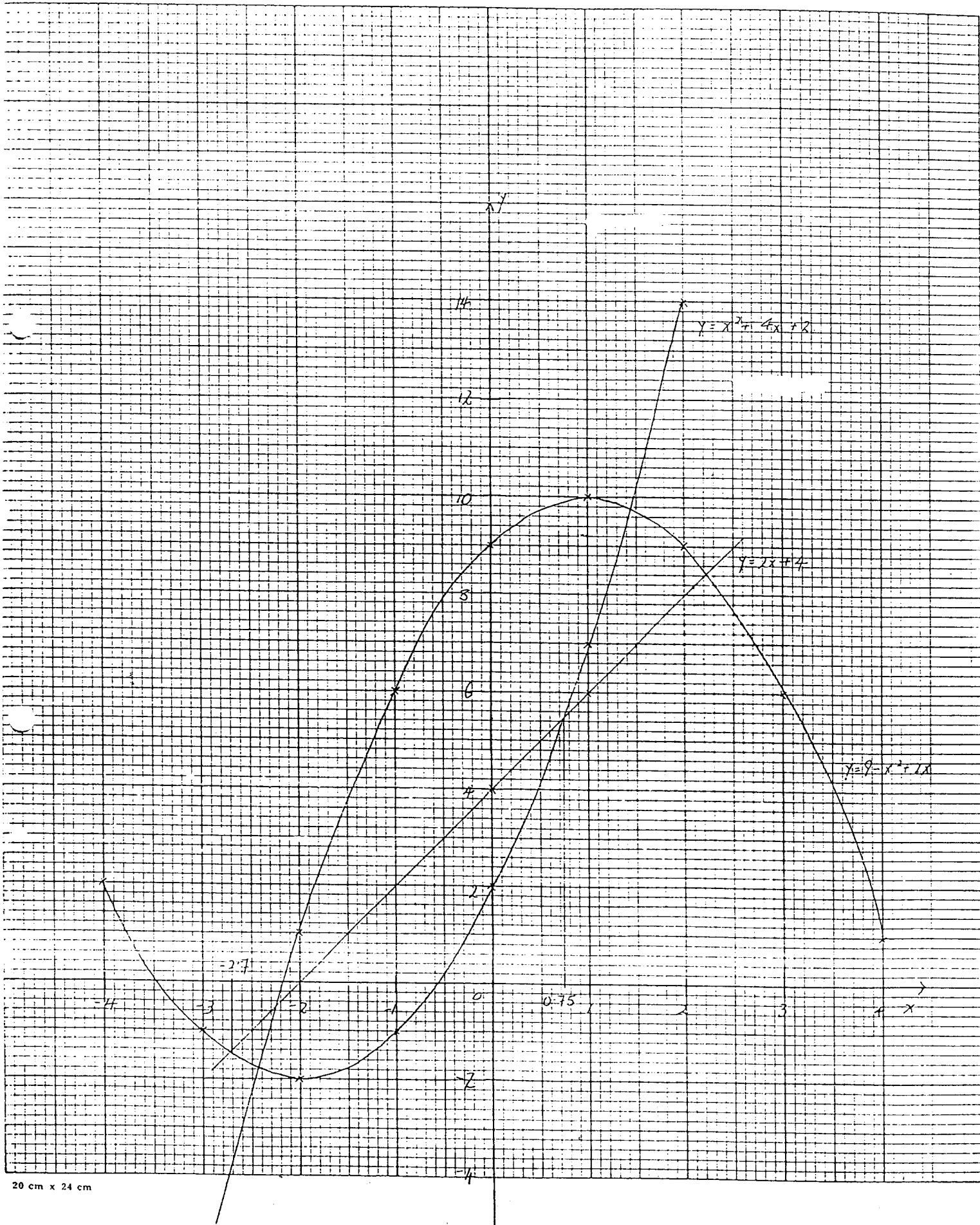
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(a)(i) $y = x^2 + 4x + 2$

When $x = -2$, $y = 4 - 8 + 2$
 $= -2$

$\therefore a = -2$

When $x = 1$, $y = 1 + 4 + 2$
 $= 7$

$\therefore b = 7$

(iii) $x^2 + 2x - 2 = 0$

$x^2 + 4x + 2 = 2x + 4$

Draw $y = 2x + 4$

$\therefore x = -2.7$ or $x = 0.75$

(b)(i) $y = 9 - x^2 + 2x$

When $x = -2$, $y = 9 - 4 - 4$
 $= 1$

$\therefore p = 1$

When $x = 3$, $y = 9 - 9 + 6$
 $= 6$

$\therefore q = 6$

(iii) $x^2 \geq 8 + 2x$

$x^2 - 2x - 8 \geq 0$

$(x - 4)(x + 2) \geq 0$

x -intercepts: $-x = 4$ and $x = -2$.

$\therefore x \leq -2$ or $x \geq 4$

(iv) $2x^2 + 2x \leq 7$

$2x^2 + 2x - 7 \leq 0$

x -intercepts: $x = \frac{-2 \pm \sqrt{4 + 56}}{4}$

$x = 1.4$ and $x = -2.4$

$\therefore -2.4 \leq x \leq 1.4$

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