IGCSE Mathematics (0580) Paper 1, November 2003

Examples of Answers to Questions 7 & 16

Script A- Question 7

7 Find the size of one of the ten interior angles of a regular decagon.

$\frac{360}{10} = 36$

Answer 36° [3]

Script B- Question 7

7 Find the size of one of the ten interior angles of a regular decagon.

decagon = ten sides
decagon has 8 triangles inside.

360 ÷ 8 = 45
45 ÷ 3 = 15 15 x 9 = 135°

Answer 135° [3]

Script C- Question 7

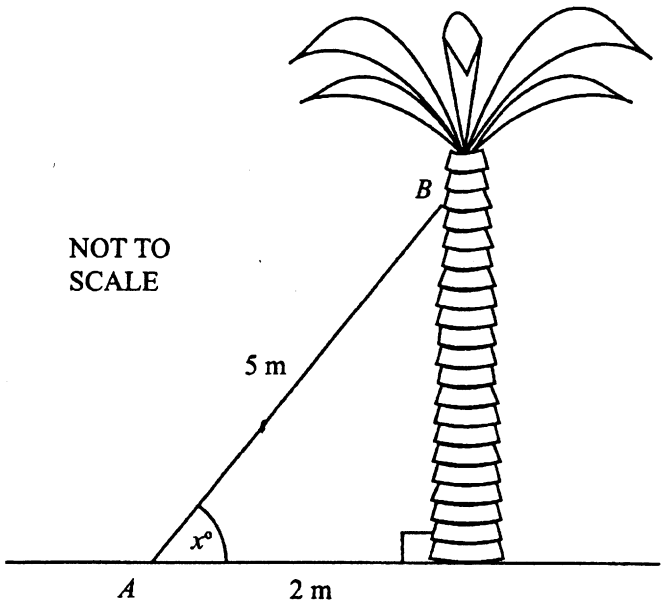
7 Find the size of one of the ten interior angles of a regular decagon.

$\frac{180 \cdot 10 \cdot 2}{10} = 144$

Answer 144° [3]

Script A- Question 16

16



The diagram shows a ladder, *AB*, standing up against a palm tree. The ladder is 5 metres long and its base is 2 metres from the tree.

(a) Calculate how high up the tree the ladder reaches.

$A = \frac{1}{2} b \times h$

$= \frac{1}{2} \times 2 \times 5$

$= 5m$

Answer (a) 5m m [2]

(b) The ladder makes an angle of $x°$ with the ground. Calculate the value of x.

$5 \times 2 + x = 180$

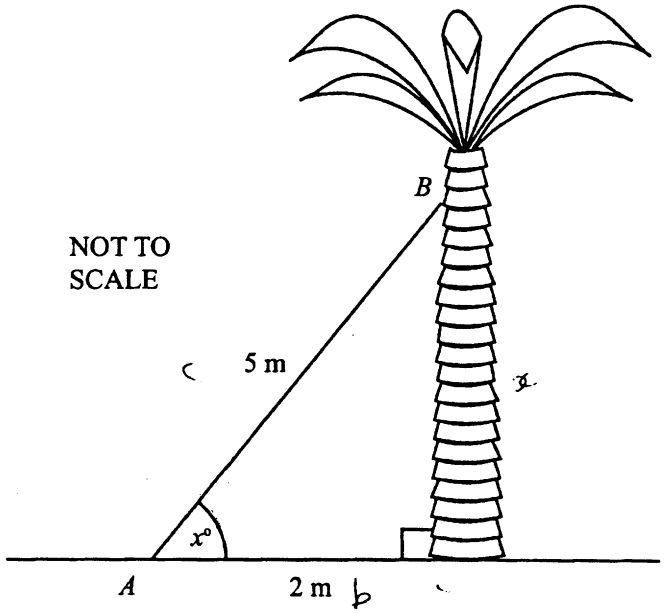
$10 + x = 180$

$\frac{10x}{10} = \frac{180}{10} = 18°$

Answer (b) $x =$ 18° [2]

Script B- Question 16

16



The diagram shows a ladder, *AB*, standing up against a palm tree. The ladder is 5 metres long and its base is 2 metres from the tree.

(a) Calculate how high up the tree the ladder reaches.

$a^2 = b^2 + c^2$

$a^2 = 2^2 + 5^2$

$a^2 = \sqrt{4 + 25}$

$a^2 = \sqrt{29}$ $= 5,385164$

Answer (a) 5.38 m [2]

(b) The ladder makes an angle of $x°$ with the ground. Calculate the value of x.

$\cos a = \frac{adj}{hyp}$

$\cos a = \left(\frac{5}{2}\right)$

$\cos^{-1}\left(\frac{5}{2}\right)$

$\tan a = \frac{opp}{adj}$

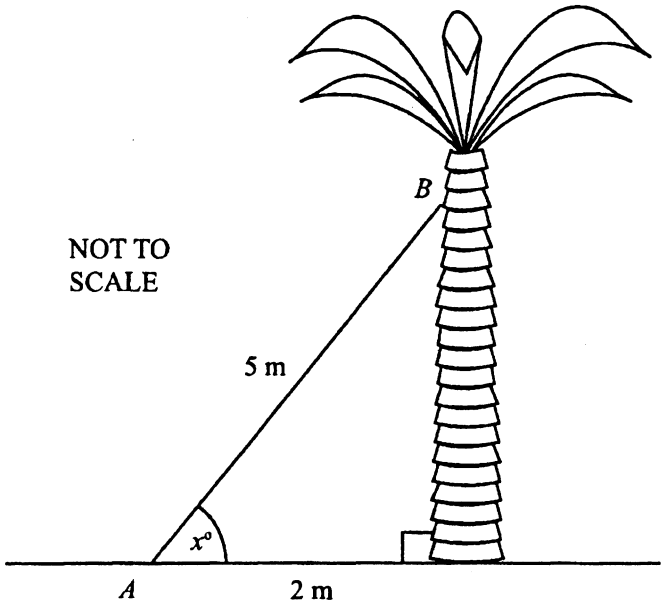
$\tan a = \left(\frac{5}{2}\right)$

$\tan^{-1}\left(\frac{5}{2}\right) = 68,198591$

Answer (b) x = 68.2 [2]

Script C- Question 16

16



The diagram shows a ladder, AB, standing up against a palm tree. The ladder is 5 metres long and its base is 2 metres from the tree.

(a) Calculate how high up the tree the ladder reaches.

$5^2 = 2^2 + x^2$

$\sqrt{21} = x$

4.583

Answer (a)....4.583.....m [2]

(b) The ladder makes an angle of $x°$ with the ground. Calculate the value of x.

$\tan x = 4.583/2$

Answer (b) x =.....66°..... [2]

IGCSE Mathematics (0580) Paper 2, November 2003

Examples of Answers to Questions 10 & 18

Script D- Question 10

10 When cars go round a bend there is a force, F, between the tyres and the ground.
F varies directly as the square of the speed, v.
When $v = 40$, $F = 18$.
Find F when $v = 32$.

$F = kv^2$

$18 = k\,40^2$

$\frac{18}{1600} = k$

$k = 0.01125$

$F = 0.01125v^2$

$= 0.01125 \times 32^2$

$= 11.52$

Answer $F =$ 11.52 [3]

Script E- Question 10

10 When cars go round a bend there is a force, F, between the tyres and the ground.
F varies directly as the square of the speed, v.
When $v = 40$, $F = 18$.
Find F when $v = 32$.

1582.

$F \propto v^2$

$18 \propto 40^2$

$.8 = k\,60^2$

$18 = k\,1600$

$\frac{18}{k} = 1600 \times 18$

$k = 0.01125$

$k32^2 = F$

$= 11.52$

Answer $F =$ 11.52 [3]

Script F- Question 10

10 When cars go round a bend there is a force, F, between the tyres and the ground.
F varies directly as the square of the speed, v.
When $v = 40$, $F = 18$.
Find F when $v = 32$.

$F \propto V$

$F \propto 32$

$F = VK$

$F = 32 \times 0{,}45 = 14{,}4$

$F \propto V$

$F = KV$

$\frac{18}{40} = \frac{40K}{40}$

$= 0{,}45 = K$

Answer $F =$ 14.4 [3]

Script D- Question 18

18 The population of Europe is 580 000 000 people.
The land area of Europe is 5 900 000 square kilometres.

(a) Write 580 000 000 in standard form.

Answer (a) $5.8 \times 10^{?}$ [1]

(b) Calculate the number of people per square kilometre, to the nearest whole number.

$\frac{5\,900\,000}{580\,000\,000}$

$= 0.0102$

Answer (b) 1 [2]

(c) Calculate the number of square **metres** per person.

$\frac{5\,900\,000 \times 1\,000\,000}{580\,000\,000}$

$= 10172.4$

Answer (c) 10200 m^2 [2]

Script E- Question 18

18 The population of Europe is 580 000 000 people.
The land area of Europe is 5 900 000 square kilometres.

(a) Write 580 000 000 in standard form.

Answer (a) 5.8×10^{8} [1]

(b) Calculate the number of people per square kilometre, to the nearest whole number.

$\frac{580\,000\,000}{5\,900\,000} = 98.305$

≈ 98

Answer (b) 98 [2]

(c) Calculate the number of square **metres** per person.

$\frac{580\,000\,00}{5\,900\,000\,000}$

Answer (c) 10.17 m^2 [2]

Script F- Question 18

18 The population of Europe is 580 000 000 people.
The land area of Europe is 5 900 000 square kilometres.

(a) Write 580 000 000 in standard form.

Answer (a) $5,8 \times 10^8$ [1]

(b) Calculate the number of people per square kilometre, to the nearest whole number.

$$\frac{580\,000\,000}{5\,900\,000} = 98,31$$

$= 98$

Answer (b) 98 [2]

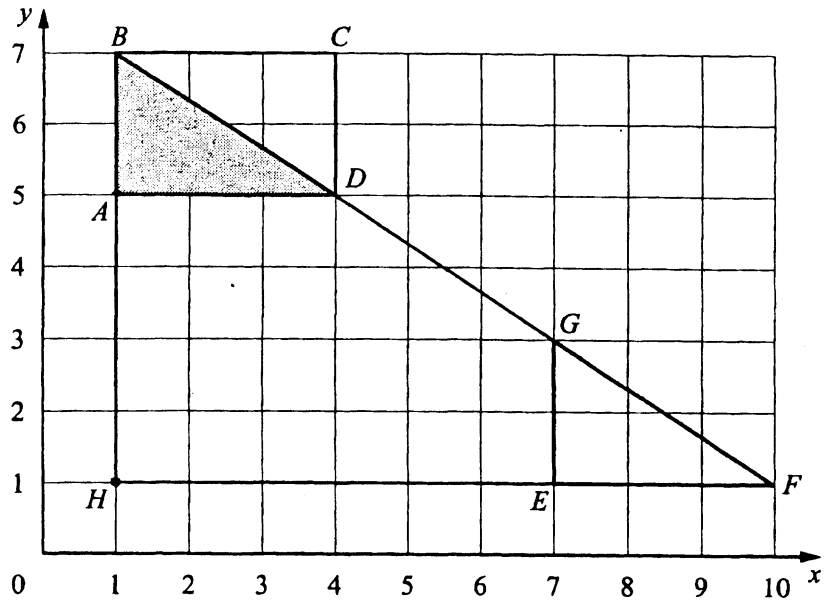
(c) Calculate the number of square **metres** per person.

Answer (c) 590 m^2 [2]

IGCSE Mathematics (0580) Paper 3, November 2003

Examples of Answers to Question 5

5



(a) Triangle *ABD* is translated onto triangle *EGF* by the vector $\begin{pmatrix} x \\ y \end{pmatrix}$.

Write down the value of x and the value of y.

Answer (a) $x =$ 4 6

$y =$ +4 -4 [2]

(b) Describe **fully** the single transformation which maps triangle *ABD* onto

(i) triangle *CDB*,

Answer (b)(i) Translation ~~of~~ about the origin. Scale factor 0. [3]

(ii) triangle *HBF*.

Answer (b)(ii) Enlargement about the point H. [3]

(c) **(i)** Work out the area of triangle *ABD*.

area $= \frac{1}{2} \times 2 \times 3$

Answer (c)(i) 6 3 [1]

(ii) What is the ratio area of triangle *ABD* : area of triangle *HBF*?
Give your answer in its lowest terms.

2, 3 or 6, 9

Answer (c)(ii) 0:6 : 0:6 [2]

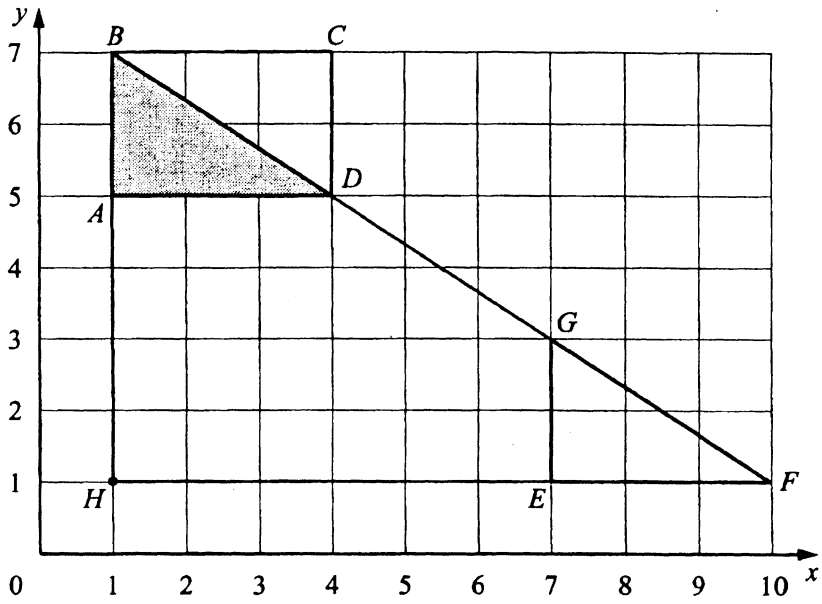
(d) Find the gradient of the line *BF*.

$y = mx + c$
$= 9x + 6$

Answer (d) 9 [2]

Script H- Question 5

5



(a) Triangle *ABD* is translated onto triangle *EGF* by the vector $\begin{pmatrix} x \\ y \end{pmatrix}$.

Write down the value of x and the value of y.

Answer (a) $x =$ 6

$y =$ -4 [2]

(b) Describe **fully** the single transformation which maps triangle *ABD* onto

(i) triangle *CDB*,

Answer (b)(i) rotation in aa

[3]

(ii) triangle *HBF*.

Answer (b)(ii) Enlagement Scale Factor 3

[3]

(c) **(i)** Work out the area of triangle *ABD*.

Answer (c)(i) 35 [1]

(ii) What is the ratio area of triangle *ABD* : area of triangle *HBF*?
Give your answer in its lowest terms.

Answer (c)(ii) 9.31 : 1.4 [2]

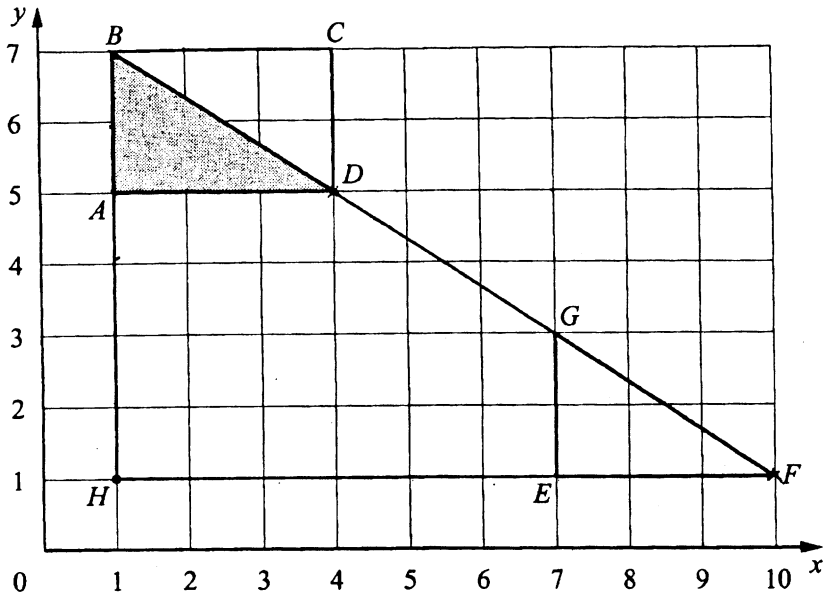
(d) Find the gradient of the line *BF*.

$\frac{3}{2}$

Answer (d) 3/2 [2]

Script I- Question 5

5



(a) Triangle *ABD* is translated onto triangle *EGF* by the vector $\begin{pmatrix} x \\ y \end{pmatrix}$.

Write down the value of x and the value of y.

Answer (a) $x =$ +6

$y =$ -4 [2]

(b) Describe **fully** the single transformation which maps triangle *ABD* onto

(i) triangle *CDB*,

Answer (b)(i) This is a reflection of ABD

[3]

(ii) triangle *HBF*.

Answer (b)(ii) Enlargement by the scaling factor of 3 squares, 3 cm [3]

(c) **(i)** Work out the area of triangle *ABD*.

$A = \frac{b \times h}{2} = \frac{3 \times 2}{2} = \frac{6}{2} = 3$ *Answer (c)(i)* 3 cm^2 [1]

(ii) What is the ratio area of triangle *ABD* : area of triangle *HBF*?
Give your answer in its lowest terms.

3 : 1.5

Answer (c)(ii) 3 : 1.5 [2]

(d) Find the gradient of the line *BF*.

$\frac{\Delta y}{\Delta x} = \frac{1-5}{10-4} = \frac{-4}{6} = -0.66$ *Answer (d)* -0.66 [2]

IGCSE Mathematics (0580) Paper 4, November 2003

Examples of Answers to Questions 4 & 5

Question 4

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

t	0	1	2	3	4	5	6	7
f(t)	0	25	37.5	43.8	46.9	48.4	49.2	49.6

(a) Using a scale of 2 cm to represent 1 unit on the horizontal t-axis and 2 cm to represent 10 units on the y-axis, draw axes for $0 \leqslant t \leqslant 7$ and $0 \leqslant y \leqslant 60$.
Draw the graph of the curve $y = f(t)$ using the table of values above. [5]

(b) $f(t) = 50(1 - 2^{-t})$.

(i) Calculate the value of f(8) and the value of f(9). [2]

(ii) Estimate the value of f(t) when t is large. [1]

(c) (i) Draw the tangent to $y = f(t)$ at $t = 2$ and use it to calculate an estimate of the gradient of the curve at this point. [3]

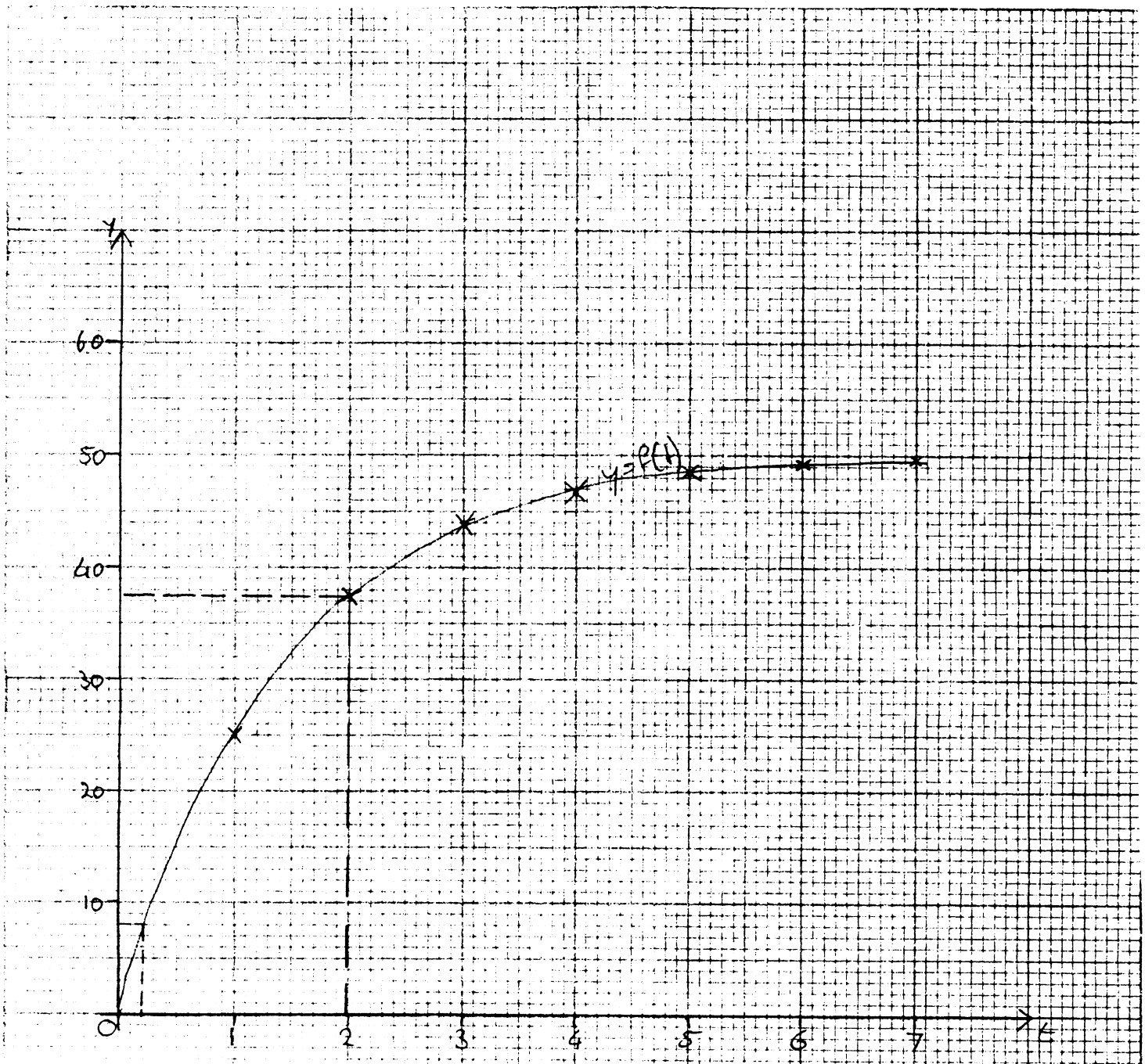
(ii) The function f(t) represents the speed of a particle at time t.
Write down what quantity the gradient gives. [1]

(d) (i) On the same grid, draw $y = g(t)$ where $g(t) = 6t + 10$, for $0 \leqslant t \leqslant 7$. [2]

(ii) Write down the range of values for t where $f(t) > g(t)$. [2]

(iii) The function g(t) represents the speed of a second particle at time t.
State whether the first or second particle travels the greater distance for $0 \leqslant t \leqslant 7$.
You **must** give a reason for your answer. [2]

Script J- Question 4



b.i) $f(t) = 50(1-2^{-t})$

$f(8) = 50(1-2^{-8})$

$= \underline{49.8}$

ii) $f(9) = 50(1-2^{-9})$

$= \underline{49.9}$

ii) when t = large $f = \underline{50}$

c.i) gradient $= \frac{\text{change } y}{\text{change } x} = \frac{-37.5}{-2} = \underline{18.75}$ ii) gradient gives us rate

Script L- Question 4

4.

b) $P(t) = 50(1 - 2^{-t})$

(i) $P(8) = 50(1 - 2^{-8})$

$= 50\left(1 - \frac{1}{2^8}\right)$

$= 50\left(1 - \frac{1}{256}\right)$

$= 50\left(\frac{255}{256}\right)$

$= 49.8$

$P(9) = 50(1 - 2^{-9})$

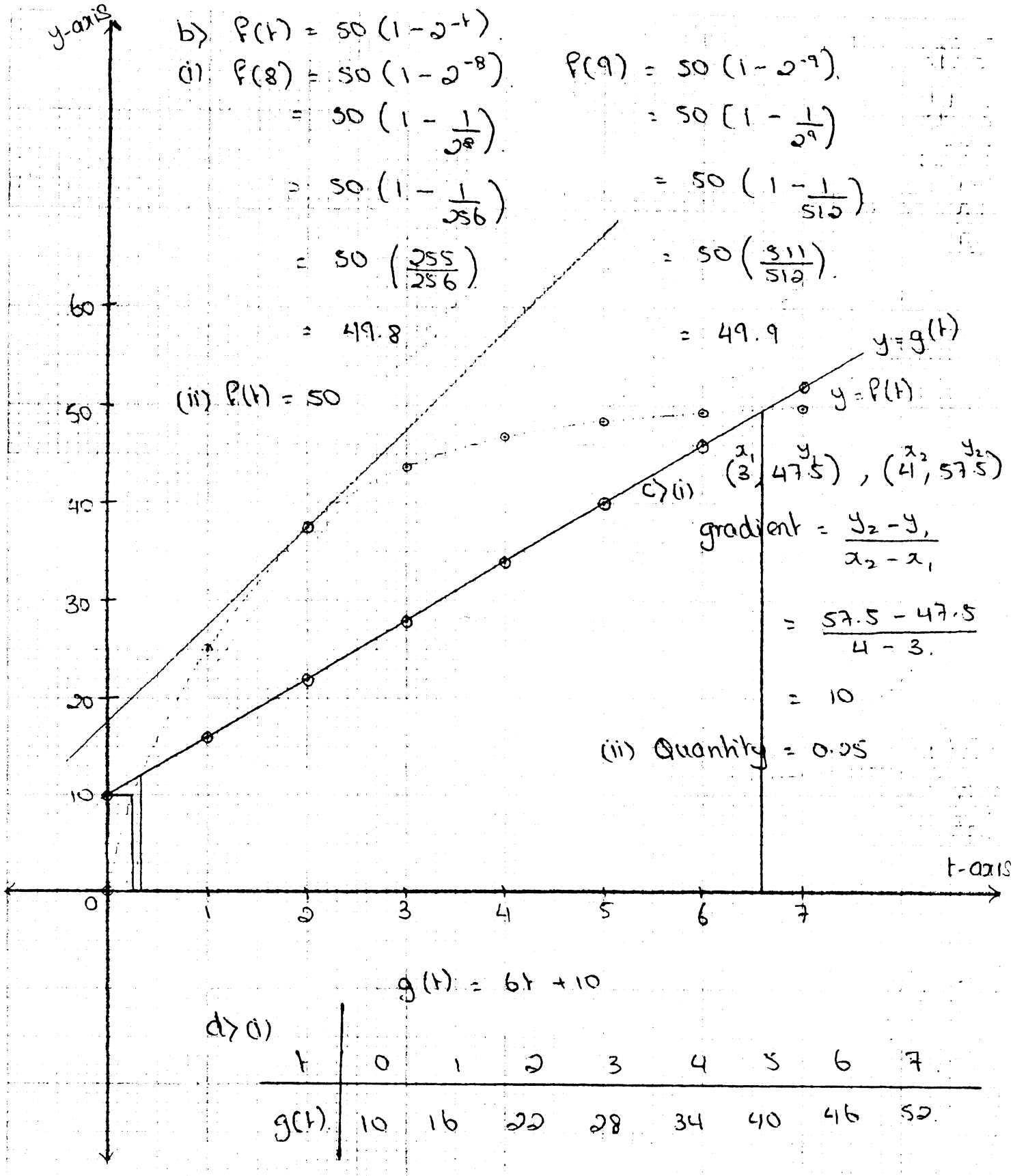
$= 50\left[1 - \frac{1}{2^9}\right)$

$= 50\left(1 - \frac{1}{512}\right)$

$= 50\left(\frac{511}{512}\right)$

$= 49.9$

(ii) $P(t) = 50$



c) (i) $(x_1, y_1) = (3, 47.5)$, $(x_2, y_2) = (4, 57.5)$

gradient $= \frac{y_2 - y_1}{x_2 - x_1}$

$= \frac{57.5 - 47.5}{4 - 3}$

$= 10$

(ii) Quantity = 0.05

$g(t) = 6t + 10$

d) (i)

t	0	1	2	3	4	5	6	7
$g(t)$	10	16	22	28	34	40	46	52

Script L- Question 4 continued....

d) (ii) $f(t) > g(t)$.

range of values $0.32 < t < 6.6$

(iii) For second particle. $(\overset{x_1}{2}, \overset{y_1}{22})$, $(\overset{x_2}{4}, \overset{y_2}{34})$

$$\text{gradient} = \frac{y_2 - y_1}{x_2 - x_1}$$

$$= \frac{34 - 22}{4 - 2} = \frac{12}{2} = 6$$

The first particle travels greater distance because it has a steeper gradient.

Question 5

5

A	D	A	M

D	A	N	I	E	L

Adam writes his name on four red cards and Daniel writes his name on six white cards.

(a) One of the ten cards is chosen at random. Find the probability that

(i) the letter on the card is **D**, [1]

(ii) the card is red, [1]

(iii) the card is red **or** the letter on the card is **D**, [1]

(iv) the card is red **and** the letter on the card is **D**, [1]

(v) the card is red **and** the letter on the card is **N**. [1]

Script J- Question 5

5a) i) p(letter D) = 3/10 = 1/5 = 0.2

ii) p(red card) = 4/10 = 2/5 = 0.4

iii) p(red or letter D) = 4/10 + 1/5 = 3/5 = 0.6

iv) p(red D) = 1/10 = 0.1

v) p(red N) = 0/10 = 0 as there is no red N.

b.i) p(both D) = 3/10 x 1/9 = 1/45 = 0.02

ii) p(both A) = 3/10 x 2/9 = 1/15 = 0.06

iii) p(same letters) = p(A) and p(D) = 3/10 x 3/10 = 3/50

Script K- Question 5

(5)

(a) (i) $\frac{2}{10}$

(ii) $\frac{4}{10}$

(iii) $\frac{4}{10} + \frac{2}{10} = \frac{6}{10}$

(iv) $\frac{4}{10} \times \frac{2}{10} = \frac{8}{100}$

(v) $\frac{4}{10} \times \frac{1}{10} = \frac{4}{100}$

(b)(i) $\frac{2}{10} \times \frac{2}{9} = \frac{4}{90}$

(ii) $\frac{3}{10} \times \frac{3}{9} = \frac{9}{90}$

(iii) $\frac{5}{10} \times \frac{5}{9} = \frac{25}{90}$

(iv) $\frac{5}{10} \times \frac{5}{9} = \frac{25}{90}$

Script L- Question 5

5a) (i) P (letter on card is D) $= \frac{1}{10} + \frac{1}{10} = \frac{2}{10} = \frac{1}{5}$ ←

(ii) P (card is red) $= \frac{4}{10} = \frac{2}{5}$ ←

(iii) P (card is red or letter on card is D)

$= \frac{4}{10} + \frac{2}{5} + \frac{1}{5}$

$= \frac{3}{5}$ ←

(iv) P (card is red and letter on card is D)

$= \frac{2}{5} \times \frac{1}{4}$

$= \frac{1}{10}$ ←

(v) P (card is red and letter on card is N)

$\frac{4}{5} \times 0 = 0$ ←

b) (i) P (both D) $= \frac{2}{10} \times \frac{1}{9}$

$= \frac{1}{45}$ ←

(ii) P (both A) $= \frac{3}{10} \times \frac{2}{9}$

$= \frac{1}{15}$ ←

(iii) P (same) $= \frac{1}{45} + \frac{1}{15}$

$= \frac{4}{45}$

(iv) P (different)

$= 1 - \frac{4}{45}$

$= \frac{41}{45}$ ←