[core:maths]
A NEW QUALIFICATION FOR WORK, STUDY & LIFE

Godalming College

You have one week to complete this. What you hand in should be your best work, and you must attempt every question.
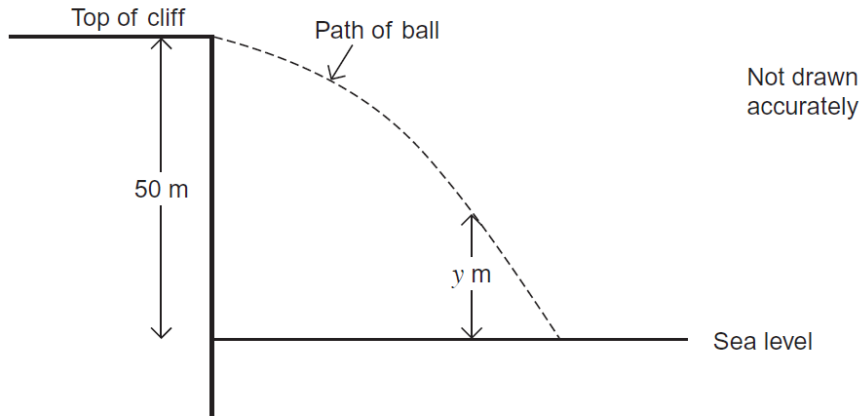
If you are stuck then please either consult notes or textbooks, attend a workshop, or ask your teacher.

You may need to refer to the formula book, found here:

or financial information, found here:

1)

A ball is kicked horizontally from the top of a cliff. The top of the cliff is 50 metres above sea level.

The height of the ball is modelled by the equation

$$y = 50 - 4.9t^2$$

y is the height of the ball, in metres, above sea level.

t is the time, in seconds, after the ball is kicked.

On the answer sheet:

(a) Complete this table of values for $y = 50 - 4.9t^2$
Values of y are given to 1 decimal place.

[2 marks]

(b) Draw the graph of $y = 50 - 4.9t^2$ for values of t from 0 to 3.5

[2 marks]

(c) Use your graph to estimate the time the ball takes to reach sea level.

[1 mark]

2) In 2012, the cost of a ticket from Ipswich to Lowestoft was £11.69. In January 2013, the cost of this ticket increased by 4.4%.

What was the cost of this ticket after the increase?

[3 marks]

3) Mark invests £3000 for three years in an easy-access savings account. This account has an AER of 1.45%, which does not include a bonus. The interest is paid at the end of each year.

How much interest will this investment gain, assuming that the interest rate stays the same during this period?

[3 marks]

4) On the answer sheet:

By drawing the graphs of $y = x^2 - 5$ and $y = 4 - x$ for $-5 \leqslant x \leqslant 5$
find the solutions of the equation $x^2 - 5 = 4 - x$

[5 marks]

5) (a) Prem is planning his 21st birthday, it will be from 8pm to midnight at the local village hall. He wants to invite 100 friends, and he will provide the drinks. How many drinks should he provide?

(b) How much money do you estimate this will cost?

(c) How might changing one of your assumptions affect your answer to part (b)?

6) There are 142 732 households in Northumberland as a whole.
The table shows the percentages of different types of household in each area of Northumberland and in Northumberland as a whole.

	Detached house or bungalow (%)	Semi-detached house or bungalow (%)	Terrace (%)	Flat (%)	Caravan or other temporary structure (%)
Alnwick	30.62	32.20	27.41	9.62	0.15
Berwick-upon-Tweed	24.80	34.47	28.97	11.50	0.27
Blyth Valley	15.12	44.69	26.99	13.11	0.03
Castle Morpeth	38.10	32.80	21.98	7.01	0.10
Tynedale	33.49	31.28	26.52	8.44	0.27
Wansbeck	14.65	33.69	39.90	11.62	0.13
Northumberland as a whole	24.58	35.85	28.93	10.49	0.14

(a) Explain why the percentages for Berwick-upon-Tweed do not sum to 100. *(1 mark)*

(b) Calculate the number of 'detached houses or bungalows' in Northumberland as a whole. *(2 marks)*

(c) There were 2990 flats in Wansbeck. Calculate how many households there are in Wansbeck. *(3 marks)*

(d) Castle Morpeth has the greatest percentage of 'detached houses or bungalows'. Does this necessarily mean that Castle Morpeth has the greatest number of 'detached houses or bungalows' when compared with the other areas of Northumberland? Give a reason for your answer. *(2 marks)*

7) Mr Brown makes a rectangular chicken run, *PQRS*
One side is an existing wall.
The other three sides are made from 70 metres of fencing.
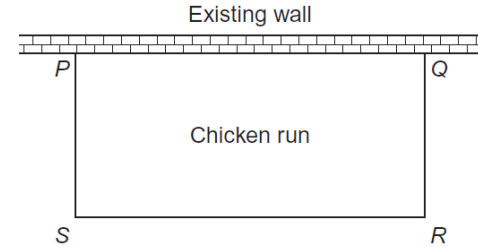
Not drawn accurately

(a) When PS = 22 metres, work out the area of the chicken run.
[2 marks]

(b) When $PS = x$ metres, the area of the chicken run, A square metres, is given by $A = 70x - 2x^2$

Here is a table of values for $A = 70x - 2x^2$

x	0	5	10	15	17.5	20	25	30	35
A	0	300	500	600	612.5	600	500	300	0

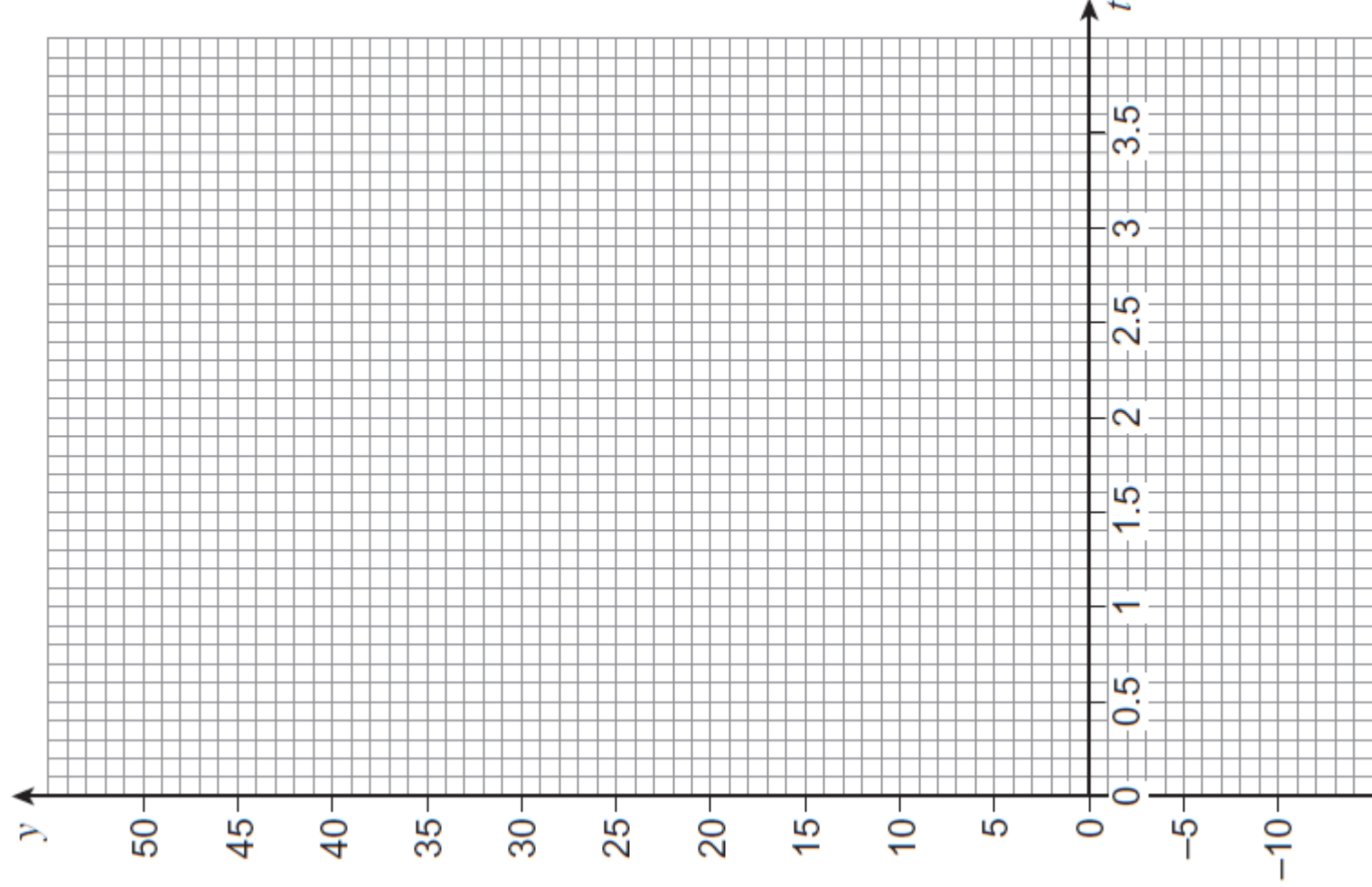Draw the graph of $A = 70x - 2x^2$ for values of x from 0 to 35
[2 marks]

(c) Mr Brown makes the chicken run so that it has the **largest possible** area. On average, each chicken needs an area of 0.75 m² to live safely.

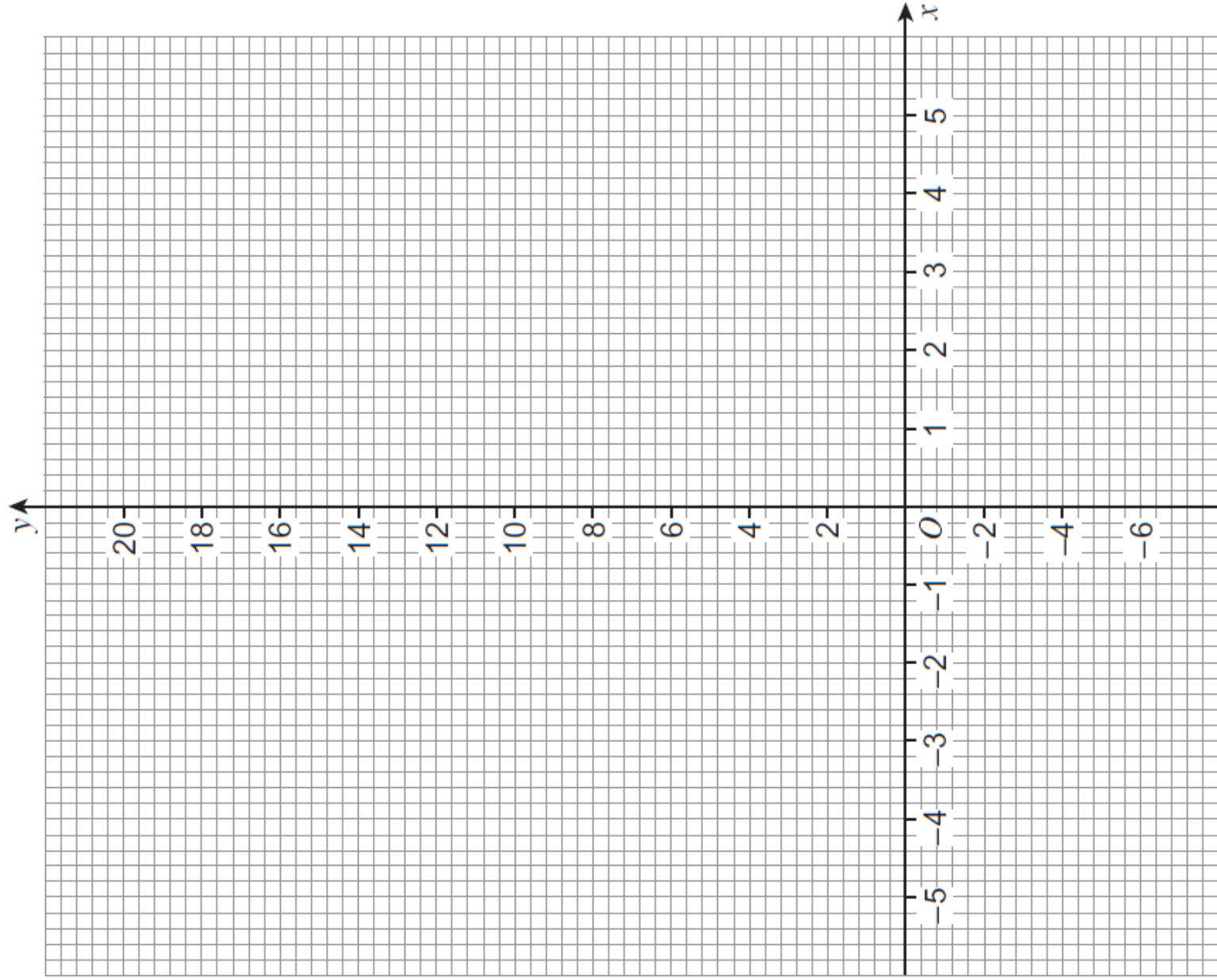Work out the largest number of chickens that can live safely in the chicken run. You **must** show your working.
[3 marks]

Homework 9C – Answer sheet

1)

t	0	0.5	1	1.5	2	2.5	3	3.5
y	50.0	48.8		39.0		19.4	5.9	−10.0

4)

7)

A

650
600
550
500
450
400
350
300
250
200
150
100
50
0

Area (m²)

0   5   10   15   20   25   30   35   x

Length of *PS* (m)