Homework 14C

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) The graph shows the temperature, T (°C) of bread, m (minutes) after it is placed in a freezer.

(a) How many minutes does it take for the temperature to reach 0 °C?

[1 mark]

(b) Estimate the rate at which the temperature is decreasing when $m = 3$
You **must** show your working.

[3 marks]

2) To motivate its staff, a company announces that it will send its best sales representatives on a holiday to Spain at the company's expense.

The company sends the best three sales representatives to Spain.

(a) One of the representatives goes to a waterpark and is charged €42.
The exchange rate is €1.17 to £1.

Calculate this cost in pounds.

[3 marks]

(b) The three representatives go out to dinner and agree that the total cost of €66 will be divided between them in the ratio 3:4:5.

How much is paid by the person who pays the most?

[3 marks]

(c) The holiday costs the company £546 for **each** representative.

The total cost for three people is 84% of the total cost for four people.

How much extra would the company have paid if it had sent the best four sales representatives instead of three?

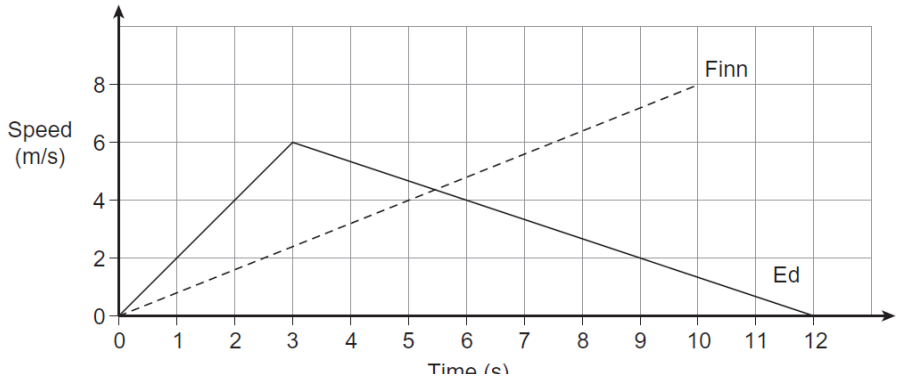
[5 marks]

3) Ed and Finn both run along the same track.

Ed runs for 12 seconds.

Finn runs for 10 seconds.

The graphs show their runs.



Work out Finn's acceleration.
State the units of your answer.

[3 marks]

4) The mass, x kg, of each of ten cars is shown on the Data Sheet, with the car's average fuel consumption, y miles per gallon.

A graph of the data is shown opposite.

A line of best fit is given by the equation

$$y = 65.2 - 0.0199x$$

(a) **On the graph opposite**, draw the line $y = 65.2 - 0.0199x$. *(3 marks)*

(b) What is the gradient of this line? *(1 mark)*

(c) Use the line to predict the average fuel consumption of a car of mass 1450 kg. *(1 mark)*

(d) Cars that have a small mass can have an average fuel consumption of over 70 mpg.

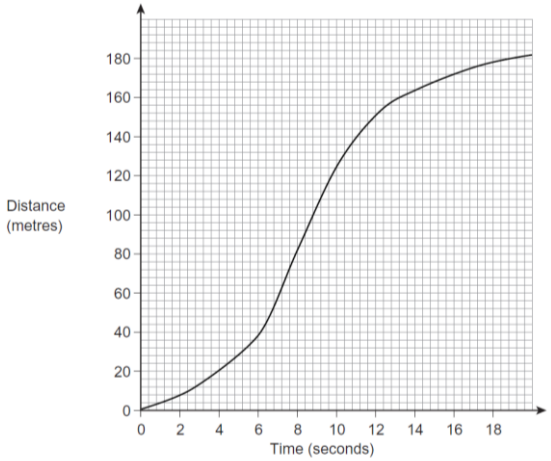
Why is the above line of best fit not appropriate for these cars? *(1 mark)*

Homework 14C

5) This distance-time graph models the journey of a bus after leaving a bus stop.

Estimate the speed of the bus 12 seconds after leaving the bus stop.

[3 marks]



6) **(a)** Complete the spreadsheet below.
Give the increases as percentages of the costs in 2010.
Give your percentages to one decimal place.

(b) State a formula which would give the content of cell E4.

7) **(a)** In 2014 the price of a tablet was lower than in 2013.

Taking 2013 as the base year, which of these statements is true about the index number for 2014?
Circle the correct answer.

[1 mark]

It is less than 100 It is exactly 100 It is more than 100

(b) In 2013 a laptop cost £500.
Using 2013 as base year, the index number for the cost of a laptop in 2014 was 110.

How much did it cost in 2014?

[2 marks]

8) The Santander e-saver account has an AER of 2.50%, with interest being compounded monthly.

(a) Tom placed £1000 in a Santander e-saver account. If he left it in the account for 12 months, making no deposits or withdrawals, how much would there be in the account at the end of this period? *(1 mark)*

(b) Show that the nominal interest rate is 2.47%. *(4 marks)*

(c) For the Nationwide account, the interest rate per month is 0.165% so that if Tom had placed his £1000 in this account, the amount of money, £A_n, in the account at the end of the nth month would be given by the recurrence relation

$$A_n = 1.00165\,A_{n-1}$$

Find the amount of money that Tom would have in his account at the end of 6 months. *(2 marks)*

9) Rhian borrows £300 and pays back £175 after one year and a final £175 after a further year. The APR, i, expressed as a decimal is therefore given by

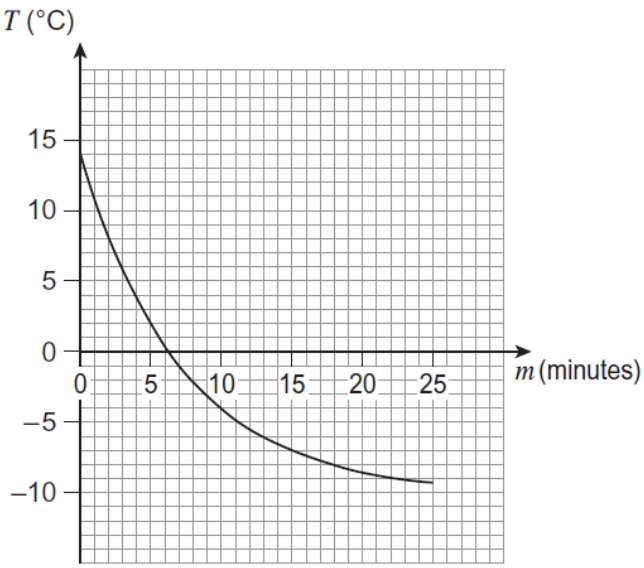
$$300 = \frac{175}{1+i} + \frac{175}{(1+i)^2}$$

(a) Show that the APR lies between 10.6% and 11%. *(3 marks)*

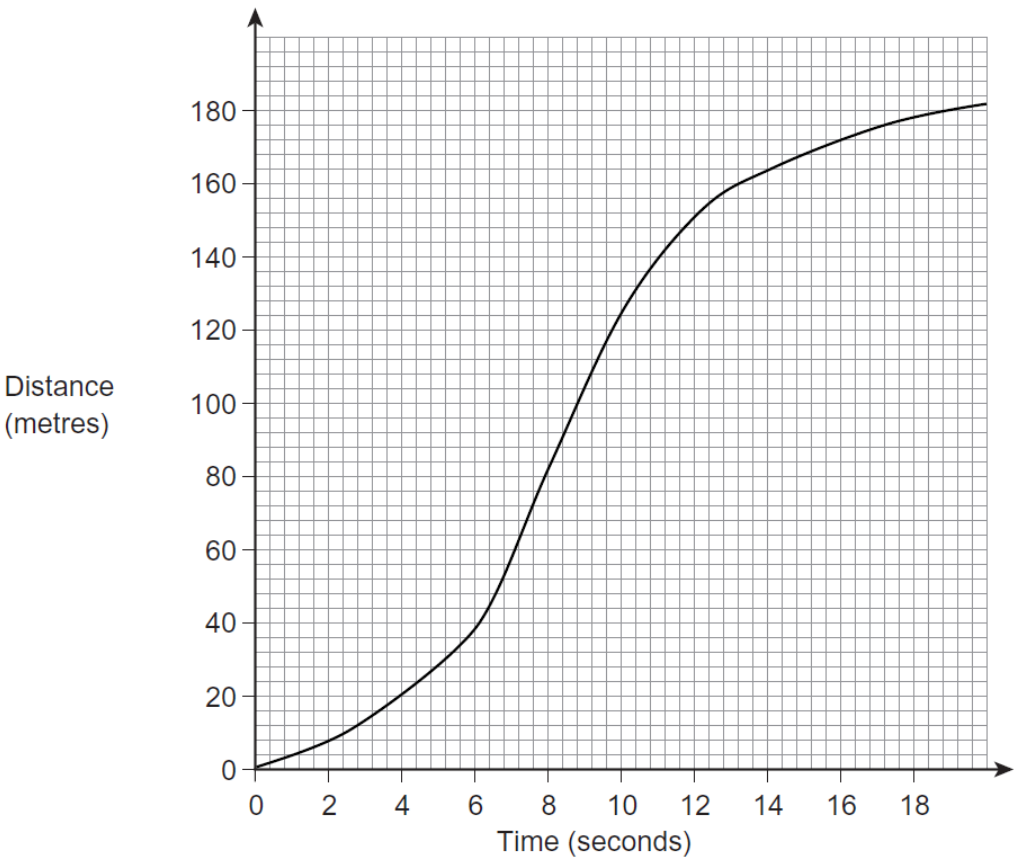
(b) Use the interval bisection method, or otherwise, to find the interest rate as a percentage correct to one decimal place. *(3 marks)*

Homework 14C – Answer sheet

1) The graph shows the temperature, T (°C) of bread, m (minutes) after it is placed in a freezer.



5) This distance-time graph models the journey of a bus after leaving a bus stop.



Homework 14C – Answer sheet

4) In a survey of cars with petrol engines, it was found that in general the greater the mass of a car the fewer miles it travelled per gallon.

Some of the results are shown below.

Mass (kg)	2306	1050	880	2500	1250	1550	1770	1750	2100	1000
Fuel consumption (mpg)	20	47	46	17	42	36	25	30	23	45