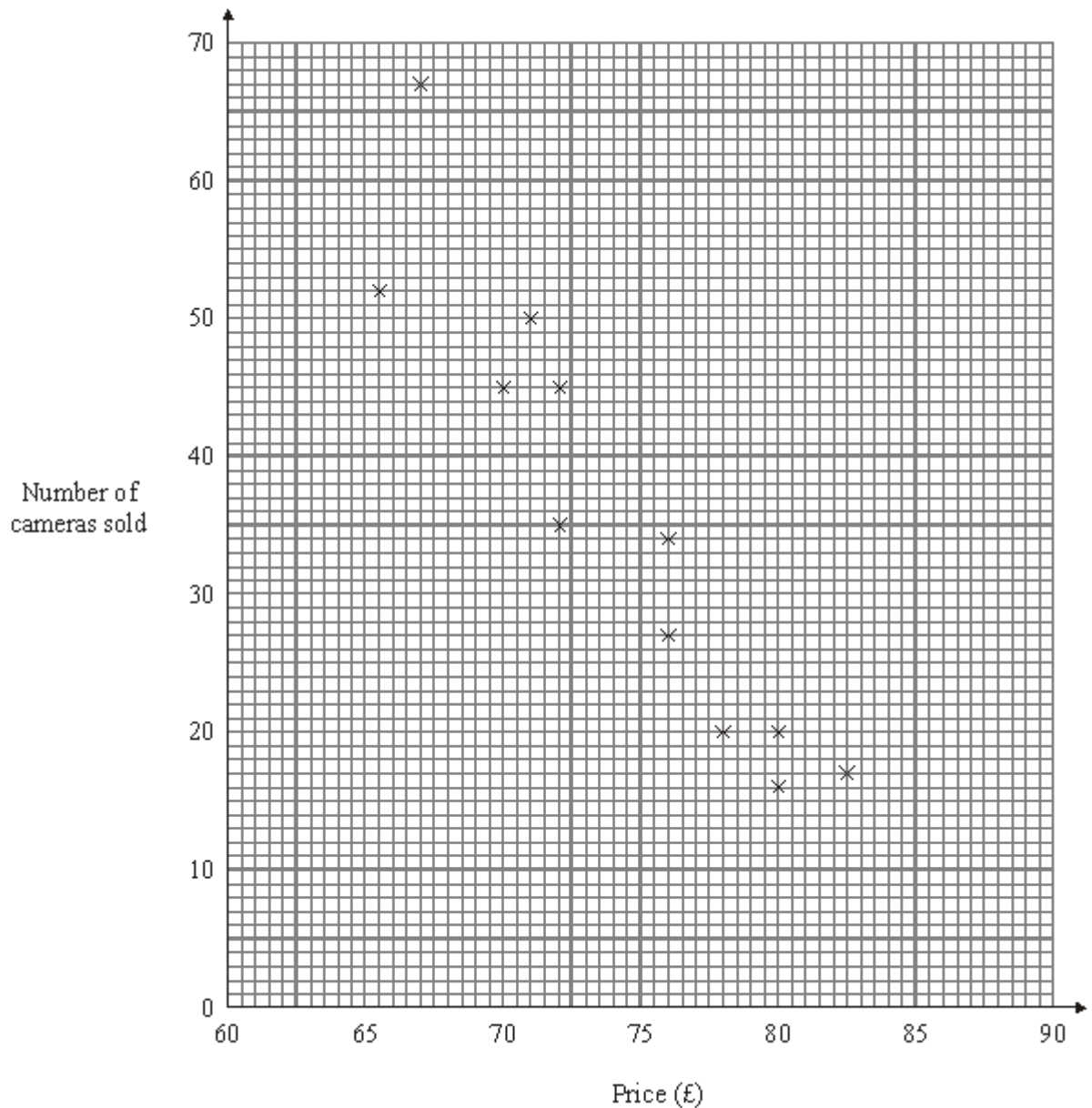


- Q1.** A superstore sells the Clicapic digital camera.
The price of the camera changes each week.
Each week the manager records the price of the camera and the number of cameras sold that week.

The scatter graph shows this information.



The table shows the prices and the numbers of Clicapic cameras sold during another 4 weeks.

Price (£)	67	70	75	80

Number of cameras sold	50	50	40	25
-------------------------------	----	----	----	----

(a) On the scatter graph, plot the information from the table. (2)

(b) Describe the relationship between the price of the camera and the number of cameras sold.

.....

(1)

(c) Draw a line of best fit on the scatter graph. (1)

(d) Use your line of best fit to estimate how many cameras are sold in a week when the price is £74.

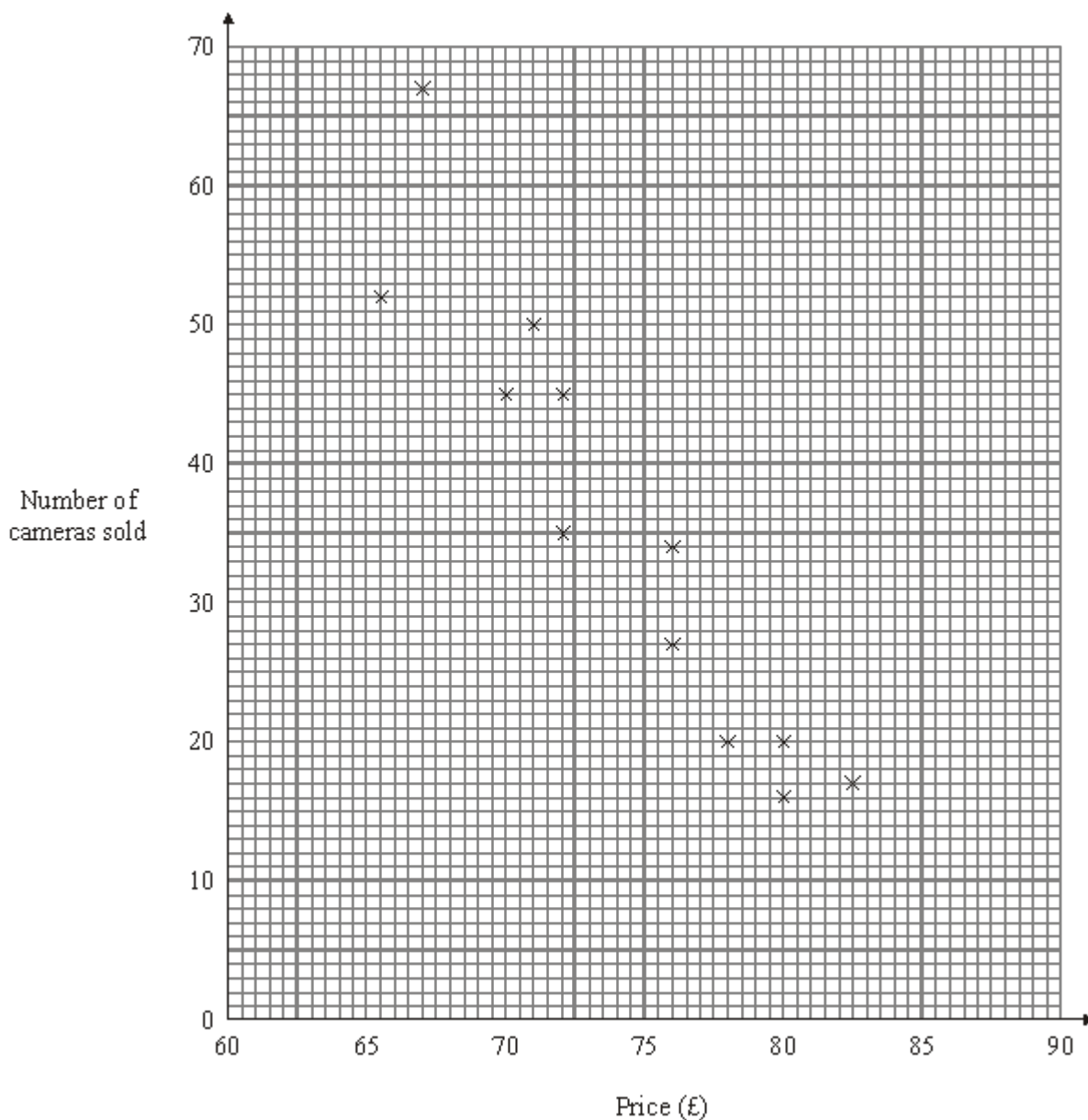
.....

(1)

(Total 5 marks)

Q2. A superstore sells the Clicapic digital camera.
 The price of the camera changes each week.
 Each week the manager records the price of the camera and the number of cameras sold that week.

The scatter graph shows this information.



- (a) Describe the relationship between the price of the camera and the number of cameras sold.

.....

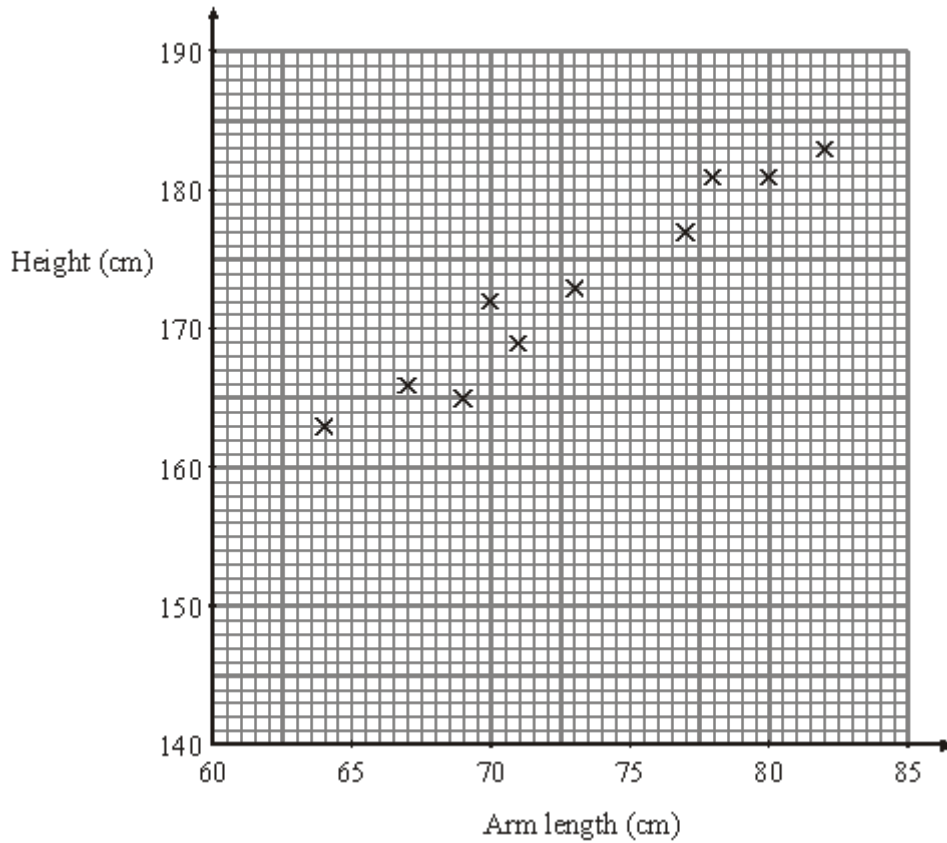
(1)

- (b) Draw a line of best fit on the scatter graph.

(1)

(Total 2 marks)

Q3. The scatter graph shows some information about 10 students. It shows the arm length and the height of each student.



(a) What type of correlation does this scatter graph show?

.....

(1)

(b) Draw a line of best fit on the scatter graph.

(1)

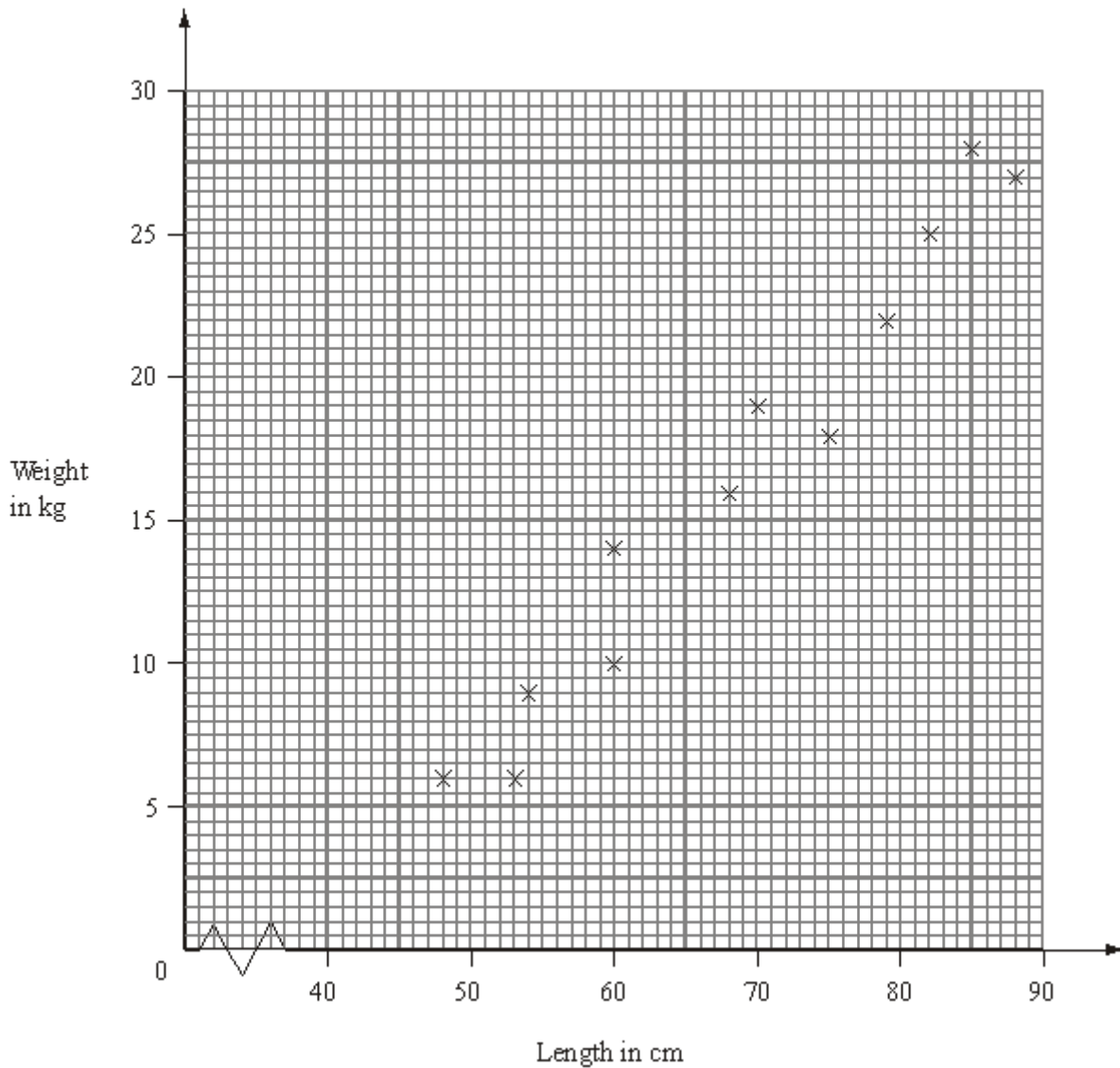
Another student has an arm length of 75 cm.

(c) Use your line of best fit to estimate the height of this student.

..... cm

(1)
(Total 3 marks)

Q4. Sanji goes fishing for pike.
The scatter graph shows information about the weights and the lengths of some of the pike Sanji caught.



(a) Describe the relationship between the weight and the length of these pike.

.....

(1)

Sanji also caught a pike of weight 24 kg and length 78 cm.

(b) Show this information on the scatter graph.

(1)

A pike has a length of 65 cm.

(c) Estimate the weight of this pike.

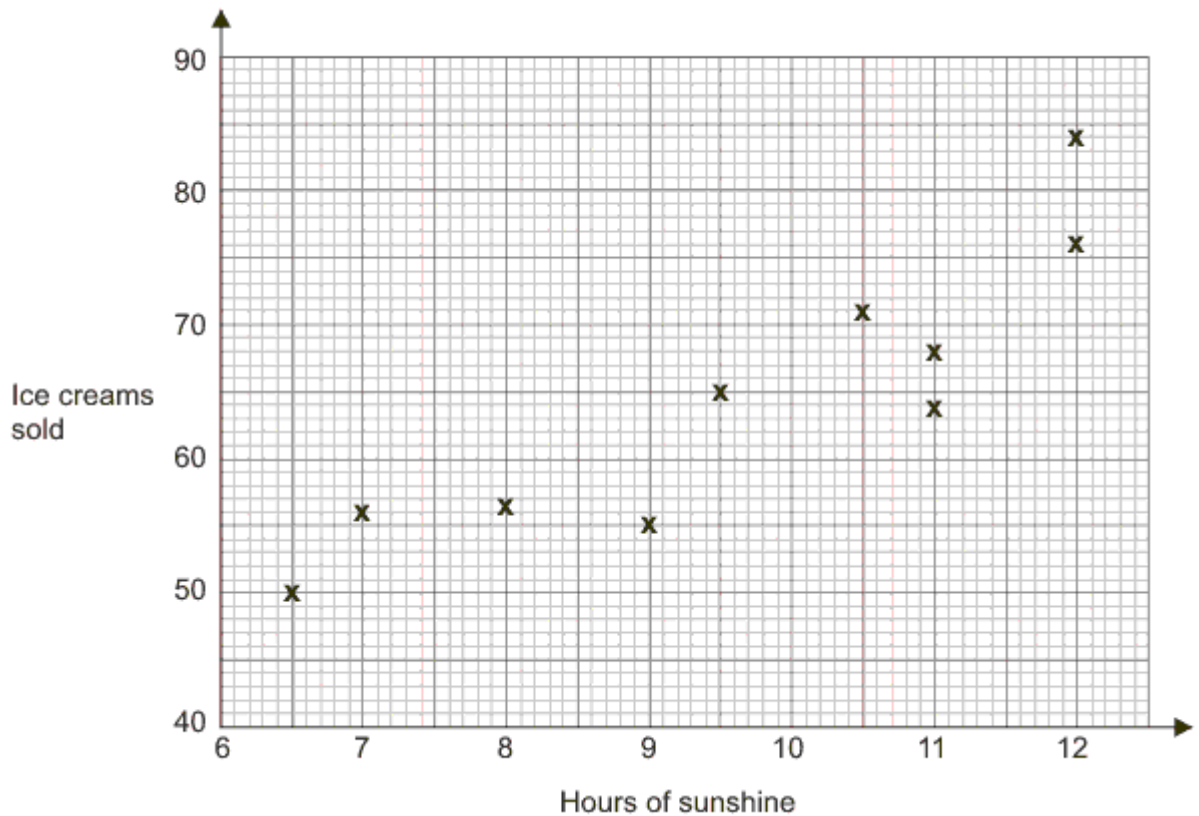
..... kg

(2)

(Total 4 marks)

Q5. A beach cafe sells ice creams. Each day the manager records the number of hours of sunshine and the number of ice creams sold.

The scatter graph shows this information.



On another day there were 11.5 hours of sunshine and 73 ice creams sold.

(a) Show this information on the scatter graph. (1)

(b) Describe the relationship between the number of hours of sunshine and the number of ice creams sold.

.....

(1)

One day had 10 hours of sunshine.

(c) Estimate how many ice creams were sold.

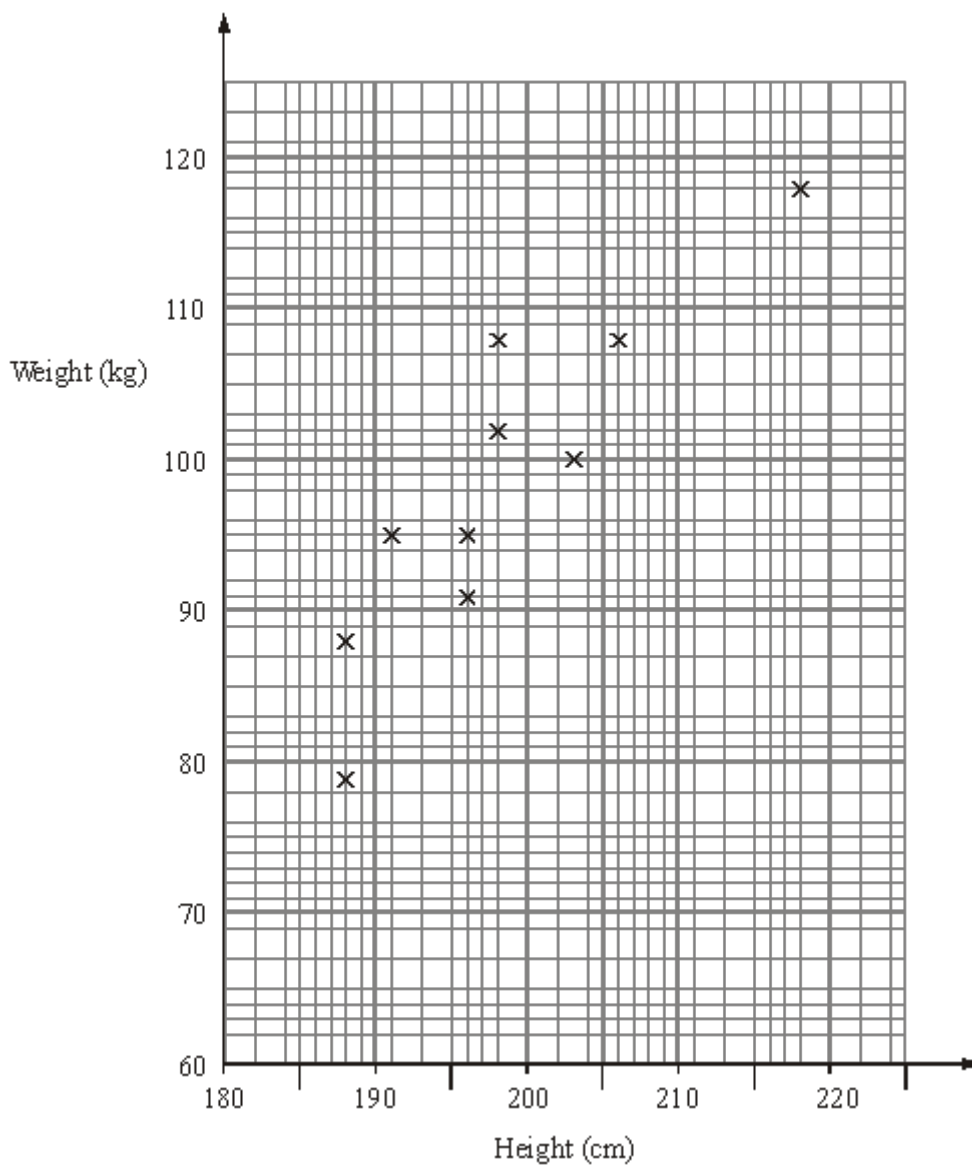
.....

(2)

(Total 4 marks)

Q6. The scatter graph shows some information about a random sample of ten male players at a basketball club.

For each player it shows his height and his weight.



(a) (i) On the scatter graph, draw a line of best fit. (1)

(ii) Work out the gradient of your line of best fit.
 (2)

(iii) Write down a practical interpretation of this gradient.

 (2)

Some of the male players at the basketball club have a weight greater than 99 kg.

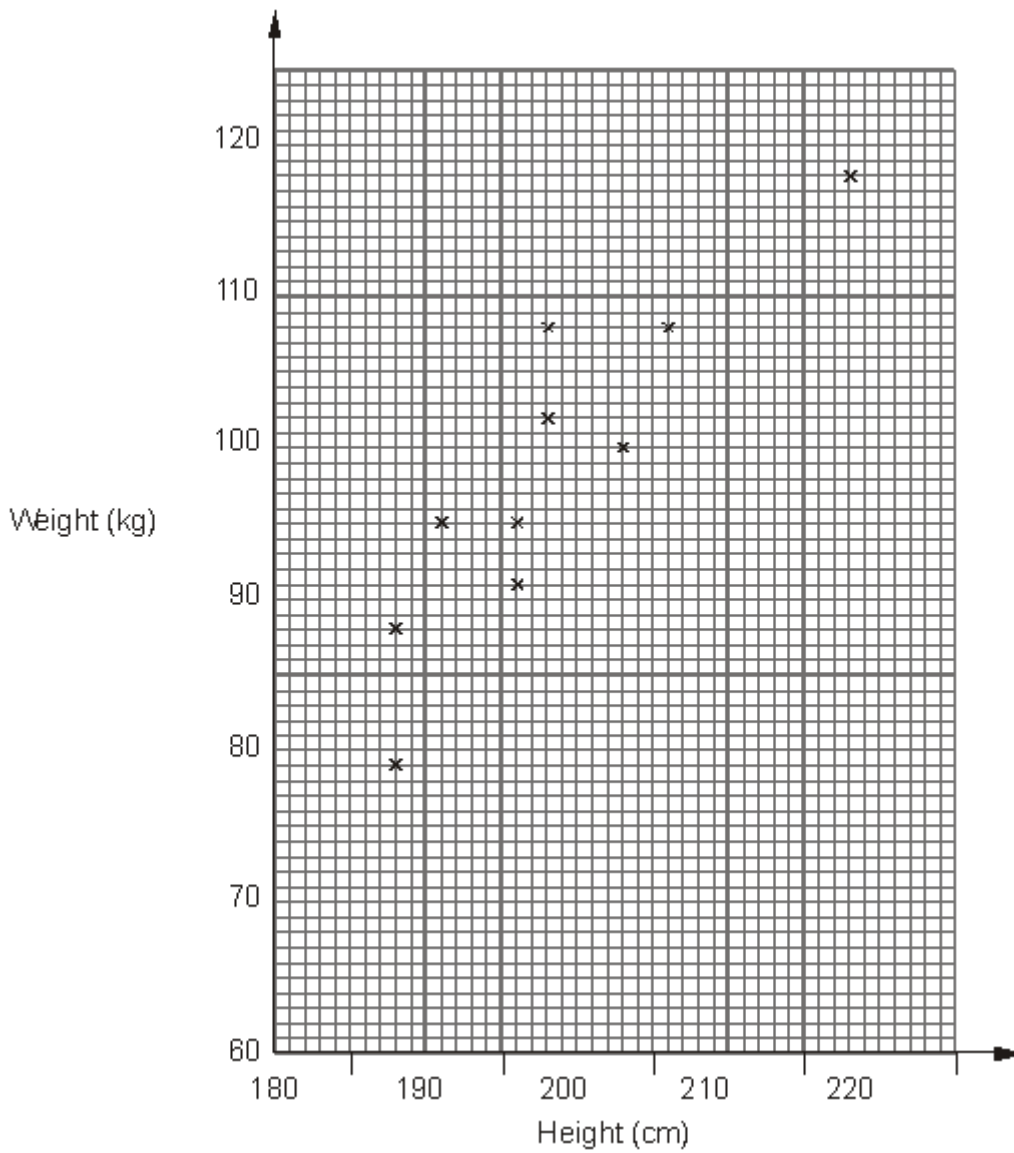
- (b) Estimate the proportion of these players who have a height less than 200 cm.

.....

(2)
(Total 7 marks)

- Q7.** The scatter graph shows some information about a random sample of ten male players at a basketball club.

For each player it shows his height and his weight.



- (a) (i) On the scatter graph, draw a line of best fit.
 (ii) Work out the gradient of your line of best fit.

.....

(3)

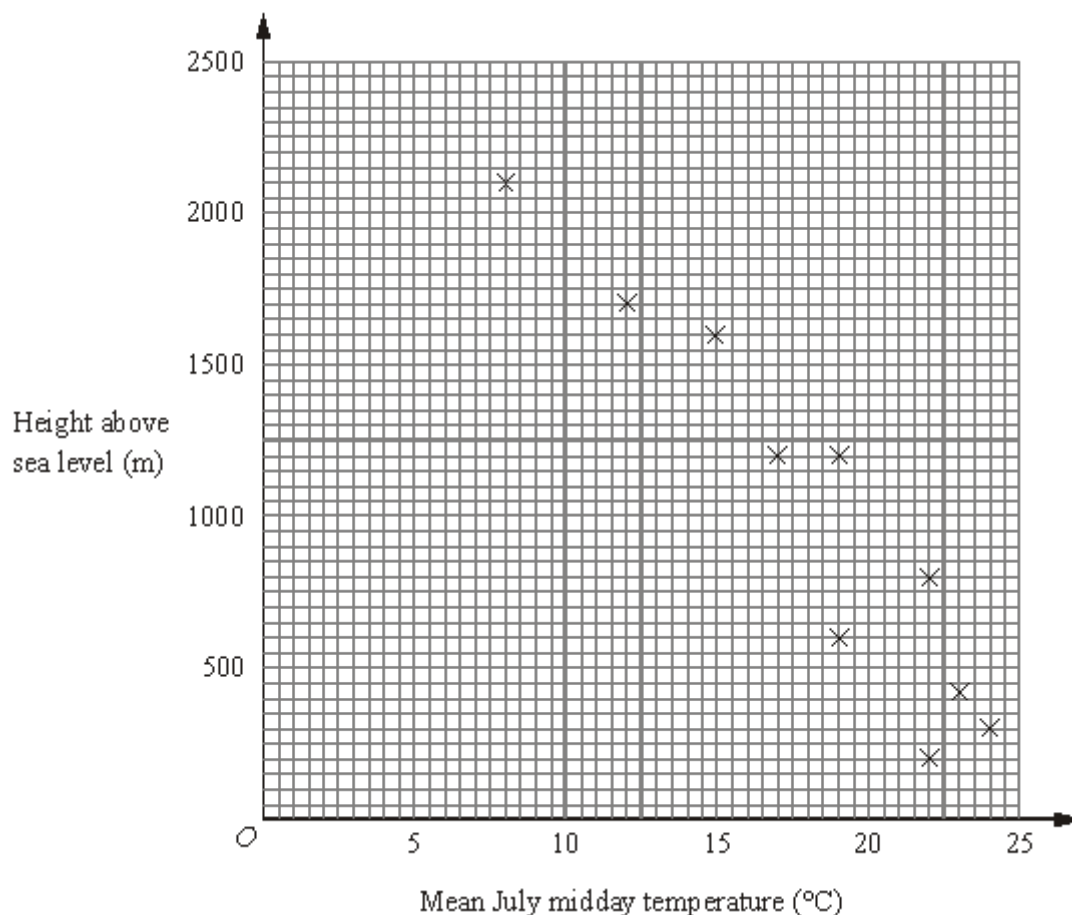
- (b) Estimate the proportion of male players in the club whose weight is greater than 99 kg and whose height is less than 200 cm.

.....

(2)

(Total 5 marks)

- Q8.** The scatter graph shows information for some weather stations. It shows the height of each weather station above sea level (m) and the mean July midday temperature ($^{\circ}\text{C}$) for that weather station.



The table shows this information for two more weather stations.

Height of weather station above sea level (m)	1000	500
Mean July midday temperature ($^{\circ}\text{C}$)	20	22

- (a) Plot this information on the scatter graph.

(1)

(b) What type of correlation does this scatter graph show?

.....

(1)

(c) Draw a line of best fit on the scatter graph.

(1)

A weather station is 1800 metres above sea level.

(d) Estimate the mean July midday temperature for this weather station.

..... °C

(1)

At another weather station the mean July midday temperature is 18°C.

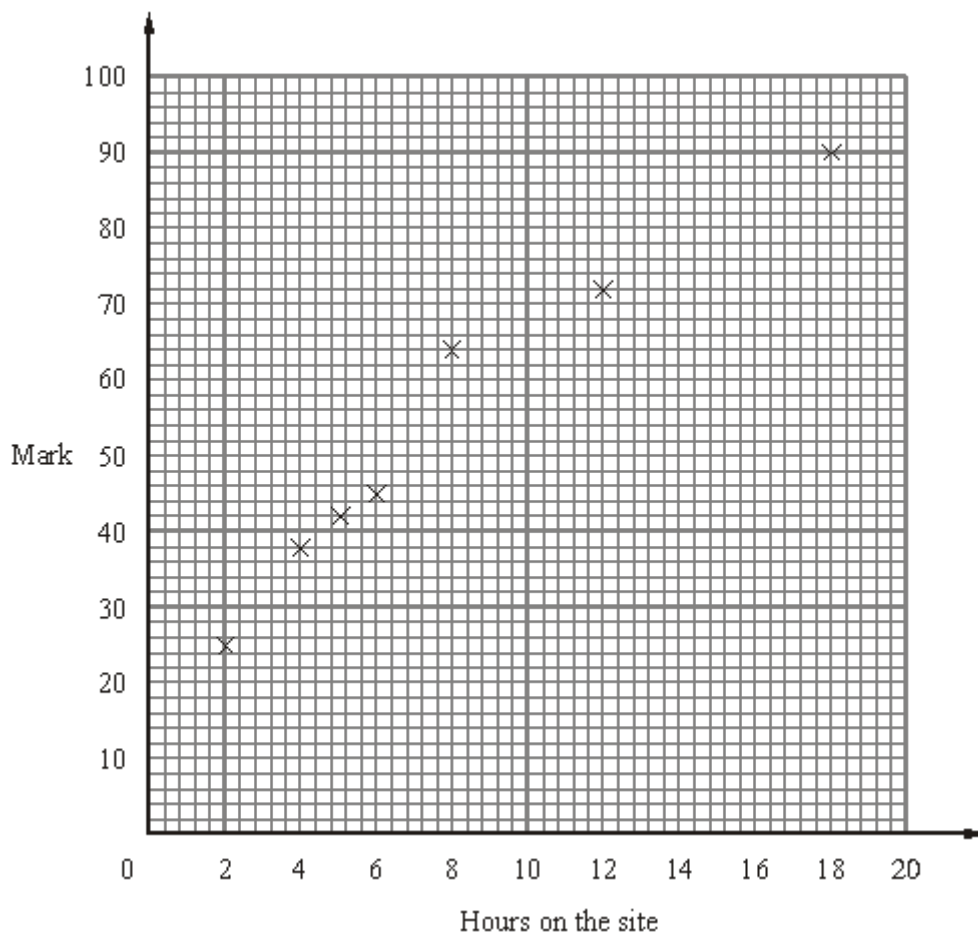
(e) Estimate the height above sea level of this weather station.

..... m

(1)

(Total 5 marks)

Q9. Some students revised for a mathematics exam. They used an internet revision site. The scatter graph shows the times seven students spent on the internet revision site and the marks the students got in the mathematics exam.



Here is the information for 3 more students.

Hours on the site	7	10	16
Mark	50	56	78

- (a) Plot this information on the scatter graph. (1)
- (b) What type of correlation does this scatter graph show?
 (1)
- (c) Draw a line of best fit on the scatter graph. (1)

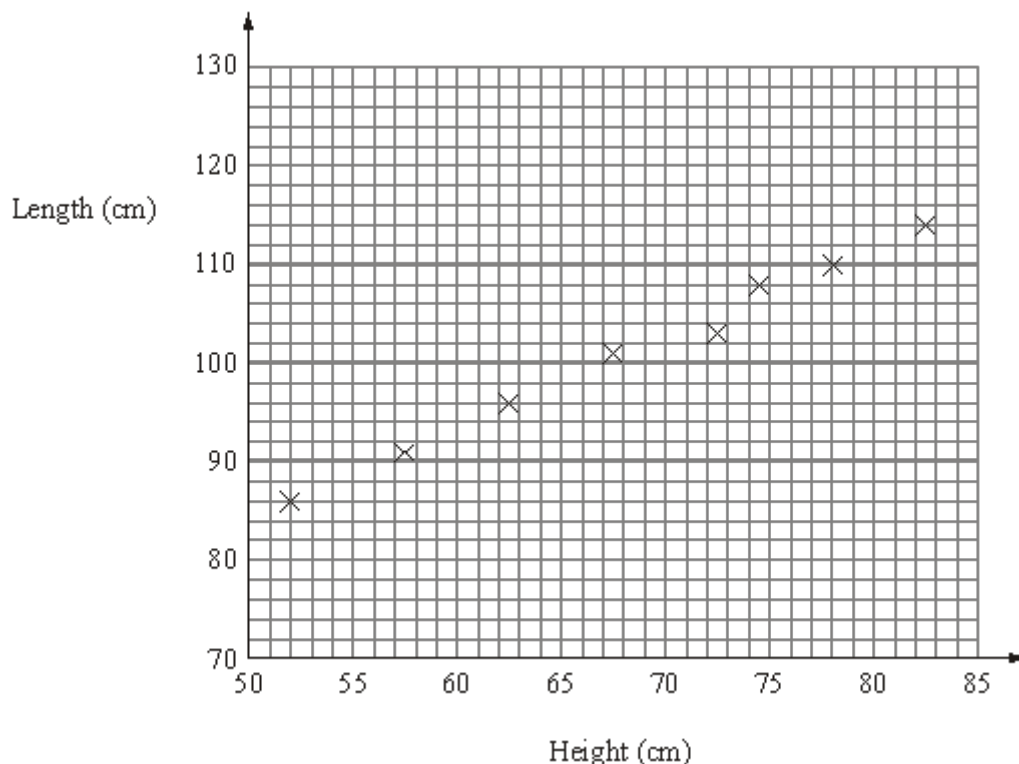
A student spent 11 hours on the internet revision site.

(d) Use the line of best fit to estimate this student's mathematics exam mark.

.....

(1)
(Total 4 marks)

Q10. The scatter graph shows information about eight sheep. It shows the height and the length of each sheep.



The table gives the height and the length of two more sheep.

Height (cm)	65	80
Length (cm)	100	110

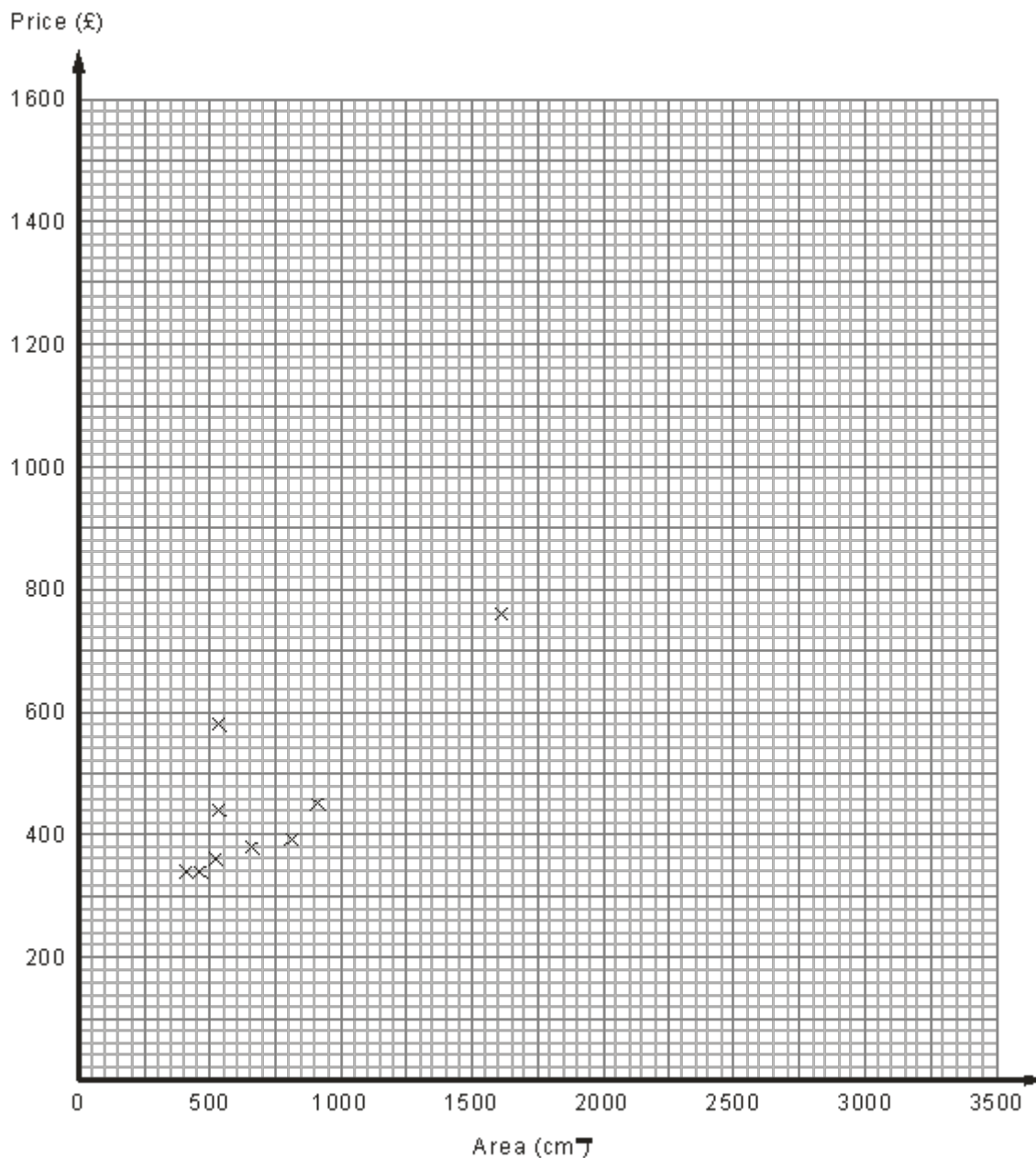
(a) On the scatter graph, plot the information from the table. (1)

(b) Describe the relationship between the height and the length of these sheep.
..... (1)

The height of a sheep is 76 cm.

(c) Estimate the length of this sheep.
.....cm (2)
(Total 4 marks)

Q11. Pablo is an artist. He wants to find estimates for the prices of some of the new pictures he has painted. The scatter graph, below, gives information about the area and the price of some of his old pictures.



The table shows the area and the price of another three of his old pictures.

Area (cm ²)	2000	2900	3260
Price (£)	1150	1250	1500

- (a) Find an estimate of the price of a new picture with an area of 2500 cm².

£

(3)

All Pablo's pictures are rectangles.
One of his pictures has a price of £1000.
Its length is 48 cm.

(b) Find an estimate for the width of the picture.

..... cm

(2)
(Total 5 marks)

M1.

	Answer	Mark	Additional Guidance
(a)	(67, 50), (70, 50), (75, 40), (80, 25)	2	B2 for 4 points plotted correctly (allow ± 2 mm tolerance) (B1 for 2 or 3 points plotted correctly)
(b)	As the price increases the number of cameras sold decreases	1	B1 for decrease in number sold with price. (accept negative correlation)
(c)	line of best fit	1	B1 for line within given limits passing between (70, 40) & (70, 55) and between (80, 15) & (80, 30)
(d)	35 – 39	1	B1 for 35 – 39 or ft their line of best fit from 74 (allow ± 2 mm tolerance)
Total for Question: 5 marks			

M2.

	Answer	Mark	Additional Guidance
(a)	As the price increases the number of cameras sold decreases.	1	B1 for decrease in number sold with increase in price oe (accept negative correlation)
(b)	Line of best fit	1	B1 for line within given limits passing between (70, 40) & (70, 55) and between (80, 15) & (80, 30)
Total for Question: 2 marks			

M3.

	Answer	Mark	Additional Guidance
(a)	Positive	1	B1 cao (Accept +ve)
(b)	Line of best fit	1	B1 for a straight line passing between (65, 160) and (65, 166) and between (80, 178) and (80, 184)
(c)	173 – 176	1	B1 for 173 – 176 or ft from a single line segment with positive gradient ± 1 full (2mm) square
Total for Question: 3 marks			

M4.

	Answer	Mark	Additional Guidance
(a)	Positive correlation, or the heavier the pike the longer it is.	1	B1 for positive correlation, or the heavier the pike the longer it is. (or equivalent) B0 for positive (relationship)
(b)	Point plotted correctly	1	B1 for a correct plot ± 1 square
(c)	12-17 kg	2	B2 for an answer in the range 12 to 17 kg inclusive OR M1 for drawing a line of best fit or vertical line drawn from 65 cm A1 for an answer in the range 12 to 17 kg or ft from "line of best fit"
Total for Question: 4 marks			

M5.

	Answer	Mark	Additional Guidance
(a)	Point at (11.5, 73)	1	B1 Point plotted $\pm \frac{1}{2}$ small square
(b)		1	B1 for description of dynamic relationship eg "the more hours of sunshine, the more ice creams sold" or positive correlation [Note: 'sunnier' implies 'more hours of sunshine']
(c)	62 – 70	2	B2 for answer in the range 62 – 70 OR M1 for a single straight line of best fit with positive gradient, passing between (6.5, 45), (6.5, 59) and (12, 70), (12, 80) or a vertical line drawn from 10 A1 for answer in range 62 – 70 or ft from single straight "line of best fit" with positive gradient
Total for Question: 4 marks			

M6.

	Working	Answer	Mark	Additional Guidance
(a)(i)		Line of best fit	5	B1 for line drawn between (190, 80), (190, 95) and (210, 105), (210, 120)
(ii)		1.25		M1 for diff. $y / \text{diff. } x$ A1 for 0.5 — 2 or ft their line of best fit
(iii)		practical interpretation		B2 for increase in kg per cm increase in height oe (B1 for a correct interpretation with only one or no units)
(b)		40%	2	M1 for a horizontal line at 99 and a vertical line at 200 or 2 seen A1 for 40% or 2/5 or 0.4 oe

Total for Question: 7 marks

M7.

	Working	Answer	Mark	Additional Guidance
(a)		Line of best fit 1.25	3	B1 for line drawn between (190, 80), (190, 95) and (210, 105), (210, 120) M1 for diff. $y / \text{diff. } x$ A1 for 0.5 — 2 or ft their line of best fit
(b)		20%	2	M1 for a horizontal line at 99 and a vertical line at 200 or 2 seen A1 for 20% or 2/10 or 0.2 oe
				Total for Question: 5 marks

M8.

	Working	Answer	Mark	Additional Guidance
(a)	Points plotted		1	B1 points plotted ± 1 full smallest square tolerance.
(b)		Negative	1	B1
(c)		lobf	1	B1 lobf that goes between (8,2000) and (8,2400) and between (24,0) and (24,500)
(d)		11-13	1	B1 11-13 or ft (tol ± 1 square) from single straight line segment with a negative gradient

(e)		850-1150	1	B1 850-1150 or ft (tol ± 1 square)) from single straight line segment with a negative gradient
Total for Question: 5 marks				

M9.

	Answer	Mark	Additional Guidance
(a)	3 plotted correctly	1	B1 ± 1 square
(b)	Positive	1	B1 for positive (correlation)
(c)	LOBF	1	B1 for line within guidelines; line goes from between (2, 18) and (2, 32) to between (16, 78) and (16, 90)
(d)	62 – 67	1	B1 for 62 – 67 OR ft from a single straight line graph of positive gradient ± 1 square
Total for Question: 4 marks			

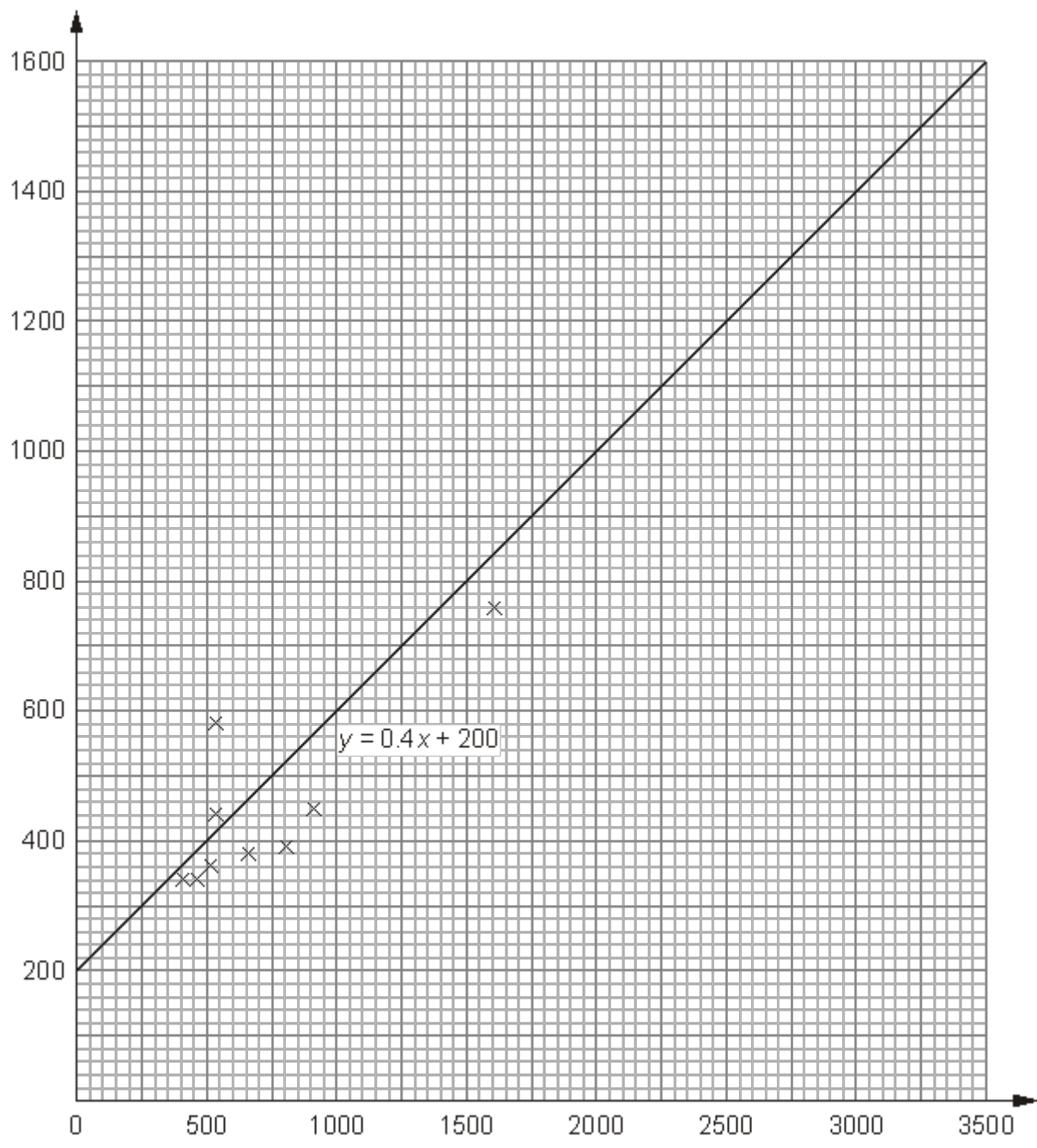
M10.

	Answer	Mark	Additional Guidance
(a)	(65, 100), (80, 110) plotted	1	B1 for plotting both points (65, 100), (80, 110) correctly (tolerance one square); ignore any additional plots given.
(b)	positive (correlation)	1	B1 for positive (correlation) or length increases with height oe

(c)	105 – 110	2	M1 for a single line segment with positive gradient that could be used as a line of best fit or a vertical line from 76 A1 for given answer in the range 105 – 110
Total for Question: 4 marks			

M11.

	Working	Answer	Mark	Additional Guidance
(a)	Plots further data Draws line of best fit Reads off value from 2500	£ 1100 — 1200	3	M1 plots further figures M1 draws line of best fit A1 1100 — 1200
(b)	Draws $y = 1000$ '2000' \div 48	42	2	M1 draws $y = 1000$ and divides by 48 A1 40 — 44
Total for Question: 5 marks				



- E1.** This question was answered well by the majority of candidates, but a significant number of candidates had difficulty in interpreting the horizontal scale.

A common error in part (a) was to plot the point (67, 50) at (66, 50) or at (68, 50).

In part (b), many candidates were able to write down an acceptable description of the relationship between the price and the number of cameras sold. A common error here was to just comment on the extreme values, e.g. 'the expensive cameras didn't sell very well', or to describe the correlation as simply "negative". In part (c), most candidates were able to draw a suitable line of best fit within the required limits. In part (d), a common error was to read the graph at £72 or at £74.50, rather than at £74.

- E2.** In part (a), many candidates were able to write down an acceptable description of the relationship between the price and the number of cameras sold. A common error here was to just comment on the extreme values, e.g. 'the expensive cameras didn't sell very well', or to describe the correlation as simply "negative". In part (b), many candidates were able to draw a suitable line of best fit within the required limits, but it was clear that a significant number of candidates were not equipped with a ruler. Candidates should be advised to bring the appropriate equipment to this examination.

A common error here was to join the points with line segments, or to draw a line with positive gradient (usually through the origin).

E3. Foundation

It was pleasing to see that over 36% scored all 3 marks on the last question on this section with a further 31% scoring 2 marks. Many did not realise that the word 'positive' was required in (a) but this did not put them off answering the rest of the question. Some unusual descriptions were seen but to describe the correlation as a "line of misfit" was perhaps taking things a little too far.

The most common error was in part (b) where many candidates felt the line of best fit had to go through the origin (60, 140) although they could still pick up the mark in (c) for an accurate reading from their line of best fit. It is also important that the line of best fit should be of sufficient length to cover the range of the given points; in some cases it was short of this length by a considerable amount. Merely joining up the points with a series of zigzag

lines was never going to satisfy the requirement of a line of best fit.

Higher

This question was also well done by the candidates on the Higher Tier with nearly 95% of the candidates scoring 2 or 3 marks. The most common error was in part (b) where many candidates felt the line of best fit had to go through the origin (60, 140) although they could still pick up the mark in (c) for an accurate reading from their line of best fit.

E4. Foundation

This question was well understood with most candidates (90%) gaining the mark for positive correlation or for an explanation of how the weight increased as the length increased. In part (b) fewer candidates (18%) gained the mark for plotting the given point on the grid correctly as they could not read the scale correctly but in part (c) 30% of candidates gained the two marks for an answer in the range 12 to 17 kg inclusive. 32% of candidates did gain a mark for showing a line of best fit or attempting to draw a vertical line at 65kg.

Higher

This question was well understood with most candidates (70%) gaining full marks. Candidates lost marks for writing positive rather than positive correlation and there were a few ambiguous uses of the word 'bigger', without defining what was bigger. In part (b) candidates lost the mark for plotting the given point on the grid correctly with the scale on the y axis providing the most trouble, but in part (c) almost all candidates gained the two marks for an answer in the range 12 to 17 kg inclusive and those that did not gained a mark for showing a line of best fit or attempting to draw a vertical line at 65kg Only 1% of candidates failed to score any marks at all in this question.

##

Foundation

This question was answered well by very many candidates, although it was alarming to see some fundamental errors in the plotting of the additional information in part (a). Many candidates also missed out the plot completely possibly because the lack of an answer line meant they went straight on to (b) without being aware of the demands of (a). In part (b), candidates needed to relate the amount of sunshine with the number of ice creams sold to be able to score the mark, descriptions such as 'the hotter it is the more ice creams are sold', which was a common answer, gained no credit. An alternative approach saying positive correlation was also acceptable but merely saying the relationship was positive was not enough.

In (c), few candidates showed any working, eg line of best fit, and either scored full marks for an answer within the given range or no marks at all. Those that drew a line of best fit often just joined the last point to the origin and were out of tolerance, but still then didn't use it to find an answer.

Higher

The majority of candidates were able to answer (a) correctly. Occasionally (11.5, 73) was not plotted or on the wrong y coordinate, otherwise very well done.

In part (b) most candidates described a dynamic relationship correctly with a minority using the words 'positive correlation'. A few though talked in terms of the gradient of the line rather than interpreting the relationship in correlation terms. Additionally a few candidates stated negative correlation or some used the phrase 'hotter' instead of hours of sunshine.

In part (c), the majority of candidates gained 2 marks. Where a line of best fit was drawn, it rarely failed to be within limits and candidates were usually successful in finding a correct answer. A substantial number did not draw a line of best fit however even then, the majority of answers were within range. Errors were often made by misreading the y -axis, common to see 67 marked with 77 on the answer line. Insufficient candidates drew the line $x = 10$ up to the 'line' and across.

- E8.** There was a lot of careless plotting where the point at $x = 22$ was plotted wrongly at $x = 21$. Most candidates knew this was negative correlation although a few tried to give a description. The line of best fit was generally well drawn although in some cases it was too short. Most candidates knew and could apply the technique of reading off values from the diagram.

E9. Foundation

In part (a) the plotting was generally good with many scoring the available mark. Those that did not, tended to plot the first point incorrectly.

There was a mixed response to part (b). Although 'positive' was often seen, many described the correlation in terms of a relationship rather than stating the type of correlation.

Many drew straight lines in part (c) and most of these fell within the guidelines. Those that failed to score often went through the origin or were more or less steep than what was required. Zigzag lines were produced by the weaker candidates showing a real lack of understanding of what was required.

The reading of the exam mark from 11 hours in (d) was often well done although quite a few candidates did leave this blank.

Higher

A standard scatter graph which was attempted successfully by most candidates. There were a few errors in plotting but most knew it was a positive correlation, although occasionally candidates offered 'increase' or chose to describe the change in mark as the hours increased. Most lines of best fit were well within the allowed tolerance and produced acceptable estimates for part (d).

- E10.** Most candidates gained marks in this question. Plotting was done in part (a) with relative ease, but the descriptions in part (b) sometimes lost marks because they were not general enough: commenting on a single point will not earn the mark. In part (c) candidates were expected to make a reasonable estimate which in many cases gained marks, with or without a line of best fit. In some cases it was clear the candidate was failing to see their answer within the context of the problem, for example giving an answer less than 70.