

Write your name here

Surname

Other names

Pearson Edexcel
International
Advanced Level

Centre Number

--	--	--	--	--

Candidate Number

--	--	--	--	--

Statistics S1

Advanced/Advanced Subsidiary

Wednesday 27 January 2016 – Morning

Time: 1 hour 30 minutes

Paper Reference

WST01/01

You must have:

Mathematical Formulae and Statistical Tables (Blue)

Total Marks

Candidates may use any calculator allowed by the regulations of the Joint Council for Qualifications. Calculators must not have the facility for symbolic algebra manipulation, differentiation and integration, or have retrievable mathematical formulae stored in them.

Instructions

- Use **black** ink or ball-point pen.
- If pencil is used for diagrams/sketches/graphs it must be dark (HB or B). Coloured pencils and highlighter pens must not be used.
- **Fill in the boxes** at the top of this page with your name, centre number and candidate number.
- Answer **all** questions and ensure that your answers to parts of questions are clearly labelled.
- Answer the questions in the spaces provided
– *there may be more space than you need.*
- You should show sufficient working to make your methods clear. Answers without working may not gain full credit.
- Values from the statistical tables should be quoted in full. When a calculator is used, the answer should be given to an appropriate degree of accuracy.

Information

- The total mark for this paper is 75.
- The marks for **each** question are shown in brackets
– *use this as a guide as to how much time to spend on each question.*

Advice

- Read each question carefully before you start to answer it.
- Try to answer every question.
- Check your answers if you have time at the end.

Turn over ►

P46949A

©2016 Pearson Education Ltd.

1/1/1/1/1/



PEARSON

1. The discrete random variable X has the probability distribution given in the table below.

x	-2	1	3	4	6
$P(X=x)$	$\frac{1}{4}$	$\frac{1}{6}$	$\frac{1}{3}$	$\frac{1}{12}$	$\frac{1}{6}$

- (a) Write down the value of $F(5)$ (1)

- (b) Find $E(X)$ (2)

- (c) Find $\text{Var}(X)$ (3)

The random variable $Y = 7 - 2X$

- (d) Find (6)
- (i) $E(Y)$
- (ii) $\text{Var}(Y)$
- (iii) $P(Y > X)$

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA



Question 1 continued

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA



DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

Question 1 continued

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

Q1

(Total 12 marks)



2.

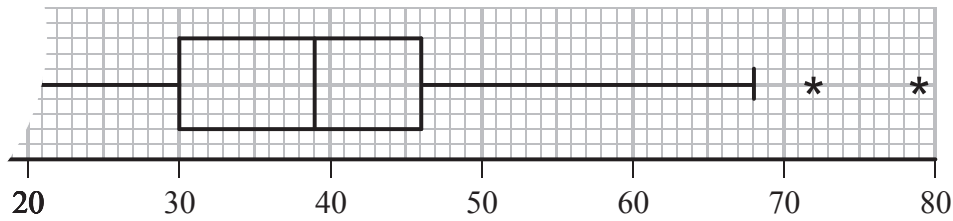


Figure 1

Figure 1 shows part of a box and whisker plot for the marks in an examination with a large number of candidates. Part of the lower whisker has been torn off.

- (a) Given that 75% of the candidates passed the examination, state the lowest mark for the award of a pass. (1)

- (b) Given that the top 25% of the candidates achieved a merit grade, state the lowest mark for the award of a merit grade. (1)

An outlier is defined as any value greater than c or any value less than d where

$$c = Q_3 + 1.5(Q_3 - Q_1)$$

$$d = Q_1 - 1.5(Q_3 - Q_1)$$

- (c) Find the value of c and the value of d . (2)

- (d) Write down the 3 highest marks scored in the examination. (2)

The 3 lowest marks in the examination were 5, 10 and 15

- (e) On the diagram on page 7, complete the box and whisker plot. (3)

Three candidates are selected at random from those who took this examination.

- (f) Find the probability that all 3 of these candidates passed the examination but only 2 achieved a merit grade. (3)

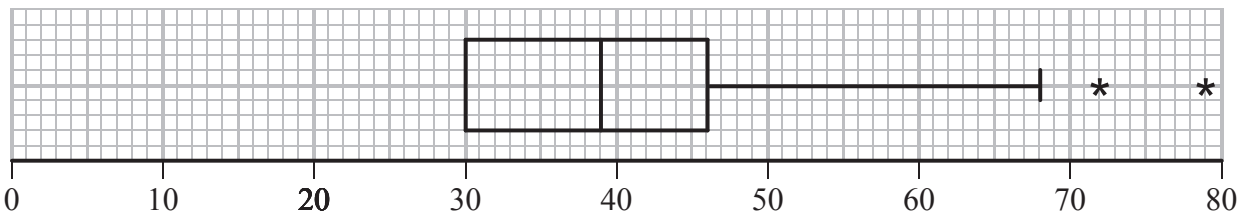


Question 2 continued

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA



Turn over for a spare diagram if you need to redraw your plot.



DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

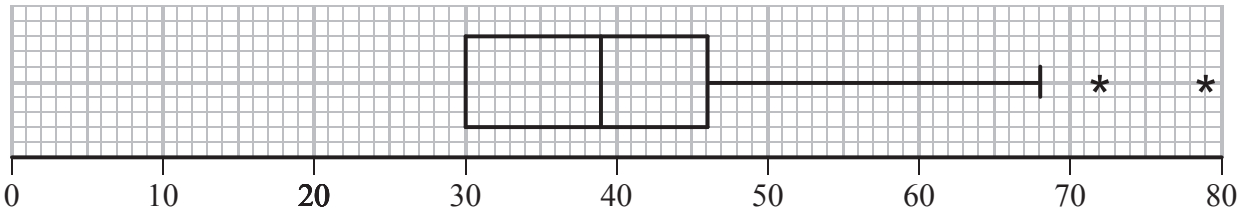
Question 2 continued

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

Only use this diagram if you need to redraw your plot.



(Total 12 marks)

Q2



3. A publisher collects information about the amount spent on advertising, £ x , and the sales, y books, for some of her publications. She collects information for a random sample of 8 textbooks and codes the data using $v = \frac{x + 50}{200}$ and $s = \frac{y}{1000}$ to give

v	0.60	8.10	4.30	0.40	1.60	6.40	2.50	5.10
s	1.84	6.73	5.95	1.30	2.45	7.46	4.82	6.25

[You may use: $\sum v = 29$ $\sum s = 36.8$ $\sum s^2 = 209.72$ $\sum vs = 177.311$ $S_{vv} = 55.275$]

- (a) Find S_{vs} and S_{ss} (3)

- (b) Calculate the product moment correlation coefficient for these data. (2)

The publisher believes that a linear regression model may be appropriate to describe these data.

- (c) State, giving a reason, whether or not your answer to part (b) supports the publisher's belief. (1)

- (d) Find the equation of the regression line of s on v , giving your answer in the form $s = a + bv$ (4)

- (e) Hence find the equation of the regression line of y on x for the sample of textbooks, giving your answer in the form $y = c + dx$ (3)

The publisher calculated the regression line for a sample of novels and obtained the equation

$$y = 3100 + 1.2x$$

She wants to increase the sales of books by spending more money on advertising.

- (f) State, giving your reasons, whether the publisher should spend more money on advertising textbooks or novels. (2)



Question 3 continued

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA



DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

This image shows a single sheet of white paper with horizontal ruling lines. The lines are evenly spaced and run across the width of the page. There are no margins, text, or other markings on the paper.

Question 3 continued

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

(Total 15 marks)

Q3

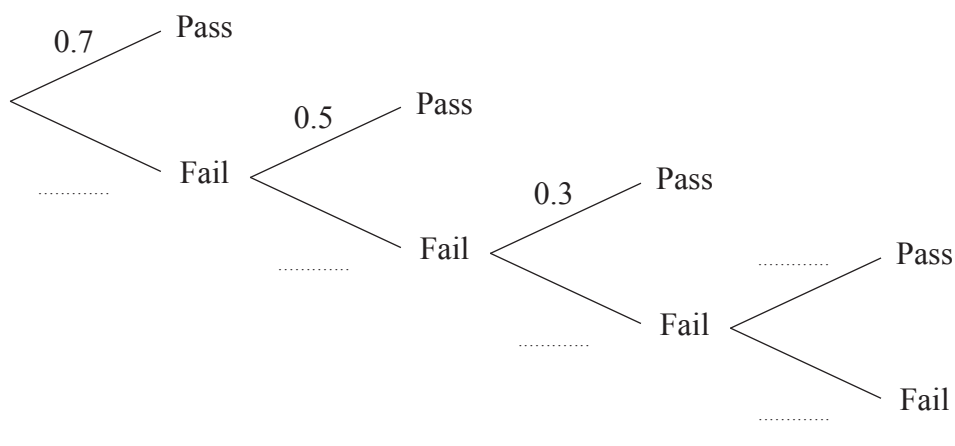


4. A training agency awards a certificate to each student who passes a test while completing a course.

Students failing the test will attempt the test again up to 3 more times, and, if they pass the test, will be awarded a certificate.

The probability of passing the test at the first attempt is 0.7, but the probability of passing reduces by 0.2 at each attempt.

- (a) Complete the tree diagram below to show this information.



A student who completed the course is selected at random.

- (b) Find the probability that the student was awarded a certificate. (2)
- (c) Given that the student was awarded a certificate, find the probability that the student passed on the first or second attempt. (3)

The training agency decides to alter the test taken by the students while completing the course, but will not allow more than 2 attempts. The agency requires the probability of passing the test at the first attempt to be p , and the probability of passing the test at the second attempt to be $(p - 0.2)$. The percentage of students who complete the course and are awarded a certificate is to be 95%

- (d) Show that p satisfies the equation

$$p^2 - 2.2p + 1.15 = 0 \quad (3)$$

- (e) Hence find the value of p , giving your answer to 3 decimal places. (3)



Question 4 continued

Handwriting practice area with 30 horizontal lines.

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA



DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

Question 4 continued

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

Q4

--	--

(Total 13 marks)



- (3)

(5)

(6)

[illegible]

Leave
blank

Question 5 continued

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA



DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

Q5

(Total 14 marks)

Turn over



- (d) By considering the change in $\sum (x - \bar{x})^2$, state what effect the inclusion of these two rabbits would have on the standard deviation. (2)

This image shows a single sheet of white paper with horizontal ruling lines. The lines are evenly spaced and run across the width of the page. There are no margins, text, or other markings on the paper.

Question 6 continued

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA



DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

DO NOT WRITE IN THIS AREA

1049

TOTAL FOR PAPER: 75 MARKS

24

