AQA

Level 3 Certificate
MATHEMATICAL STUDIES

Paper 2B Critical path and risk analysis

Wednesday 25 May 2016   Morning   Time allowed: 1 hour 30 minutes

Materials
For this paper you must have:
- a clean copy of the Preliminary Material and formulae sheet (enclosed)
- a scientific calculator or a graphics calculator
- a ruler.

Instructions
- Use black ink or black ball-point pen. Pencil should only be used for drawing.
- Fill in the boxes at the top of this page.
- Answer **all** questions.
- You must answer questions in the space provided. Do not write outside the box around each page or on blank pages.
- Show all necessary working; otherwise, marks for method may be lost.
- Do all rough work in this book. Cross through any work that you do not want to be marked.
- The **final** answer to questions should be given to an appropriate degree of accuracy.
- You may **not** refer to the copy of the Preliminary Material that was available prior to this examination. A clean copy is enclosed for your use.

Information
- The marks for questions are shown in brackets.
- The maximum mark for this paper is 60.
- You may ask for more answer or graph paper, which must be tagged securely to this answer booklet.
- The paper reference for this paper is 1350/2B.

1350/2B

Answer **all** questions in the spaces provided.

1 Use **Facebook Facts** on page 2 of the Preliminary Material.

1 (a) According to the article, Facebook had 1230 million monthly active users worldwide by the end of 2013

Circle 1230 million written in standard form.

[1 mark]

1230×10^6 $\qquad$ 1.23×10^7 $\qquad$ 1.23×10^8 $\qquad$ 1.23×10^9

1 (b) Suggest **two** improvements that could be made to the presentation of the bar chart in the article.

[2 marks]

Improvement 1

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Improvement 2

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1 (c) Joe has just started working for Survey Hunt, a social media research company.

Joe calculates the mean increase in the number of active Facebook users per year from the beginning of 2008 to the end of 2013

His calculation is as follows.

$$\frac{(145 - 58) + (360 - 145) + (680 - 360) + (845 - 608) + (1056 - 845) + (1230 - 1056)}{5}$$

Critically analyse Joe's calculation, stating any corrections or improvements that could be made.

[3 marks]

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Turn over ▶

1 (d) Just before Facebook bought Instagram, Facebook had 900 million users.

As part of the purchase, each Instagram user was automatically given a Facebook account.

On 10 April 2012, Survey Hunt carried out a survey about the public's opinion of social media.

A sample of 350 people with Facebook accounts took part in this survey.

Of these 350 people, 25 were Instagram users who had just been given a Facebook account.

Survey Hunt claimed that its survey fairly represented the Instagram users who had just been given a Facebook account.

Does the data support the claim?
You **must** show your working.

[4 marks]

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1 (e) On 4 February 2014, Lena had 50 shares in Facebook.

The exchange rate that day was £1 = $1.60

She said,

"My shares in Facebook are worth more than £2000"

Was she correct?
You **must** show your working.

[2 marks]

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Turn over for the next question

Turn over ▶

2 Use **Global Adult Literacy** on page 3 of the Preliminary Material.

2 (a) Some members of UNESCO suggested that the data had not been presented well.

2 (a) (i) Give one reason why they might suggest this with regard to **Figure 1**

[1 mark]

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2 (a) (ii) Give one reason why they might suggest this with regard to **Table 1**

[1 mark]

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2 (b) The two statements below were made on an online forum discussing adult literacy rates.

'The number of literate adults in the world in 2012 reached nearly 4.2 billion.'

(Paul)

'Central Asia has made the greatest progress in improving adult literacy over the past two decades.'

(Rena)

Critically analyse these two statements.
Show working to justify your comments.

[6 marks]

Paul's statement

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Rena's statement

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Turn over ▶

3 After a passenger plane lands at an airport there is a limited amount of time to get the plane ready for its next flight.

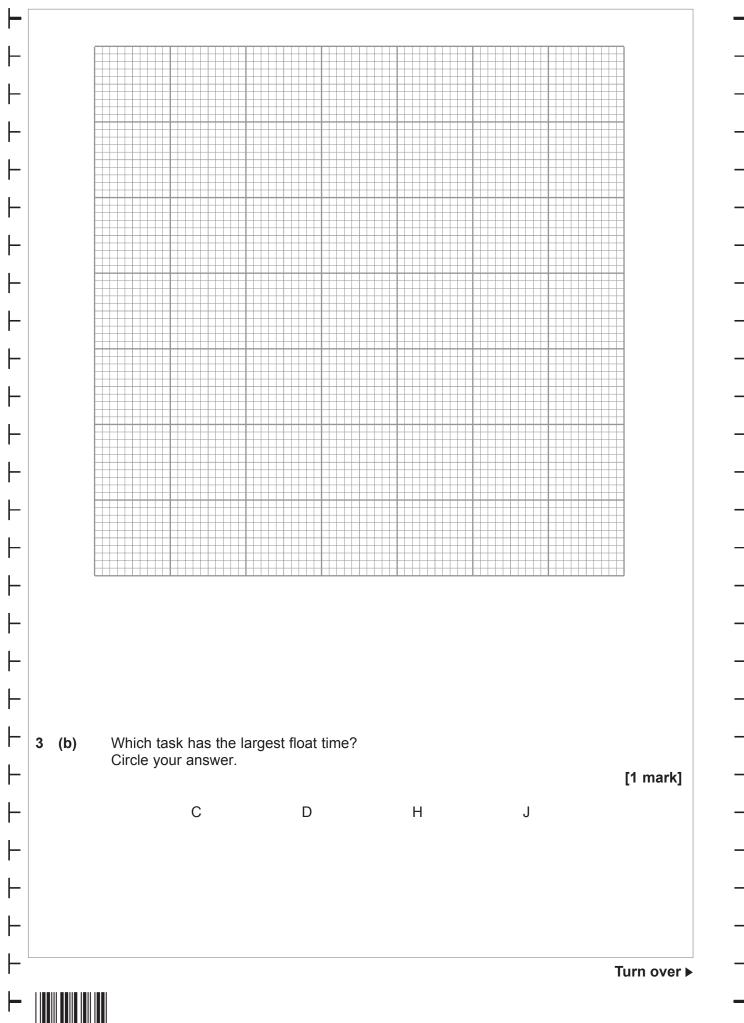The table shows the activities after a plane lands at an airport.

It also shows

- the length of time taken for each activity
- the earliest start time for each activity
- the latest finish time for each activity.

Task	Activity	Length of time taken (minutes)	Earliest start time	Latest finish time
A	Plane taxis from runway after landing	12	0	12
B	Arriving passengers disembark	20	12	32
C	Arriving luggage is taken from hold	30	12	48
D	Plane is refuelled	18	12	42
E	Rubbish is collected and trays wiped	10	32	42
F	Departing luggage transported to hold	40	42	82
G	Drinks and snacks trolley re-stocked	7	42	49
H	Technical safety checks performed	30	42	92
I	Departing passengers embark	35	49	84
J	Luggage hold checked and sealed	4	82	92
K	Passenger safety checks	8	84	92
L	Plane taxis to runway for take off	12	92	104

3 (a) Draw a Gantt chart for the process.

[4 marks]

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3 (b) Which task has the largest float time?
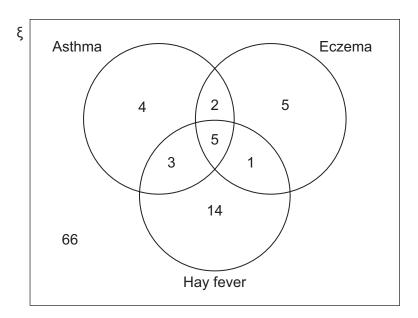Circle your answer.

[1 mark]

C   D   H   J

4 A person may suffer from one or more of the linked medical conditions asthma, eczema and hay fever.

The Venn diagram shows the percentages of people in the UK who suffer from these conditions.

4 (a) Calculate the probability that a person who suffers from eczema also suffers from hay fever.

[2 marks]

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Answer _____

A new brand of indigestion medication is made.

This indigestion medication cannot be taken with hay fever medication.

4 (b) Use the Venn diagram to calculate the probability that a person in the UK, chosen at random, can take the indigestion medication.

[2 marks]

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Answer _____

4 (c) Give a reason why the actual probability might be higher than the probability calculated in part **(b)**.

[1 mark]

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Turn over for the next question

Turn over ▶

5 Customers can try to buy items from a shopping channel by internet or by telephone.

The probability that a customer tries to order by internet is 0.69

If a customer tries to order by internet the probability that the item is in stock is 0.85

If a customer tries to order by telephone the probability that the item is in stock is 0.95

5 (a) Calculate the probability that a customer, chosen at random, tried to order by telephone **and** found that the item was in stock.

[2 marks]

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Answer _____

5 (b) 200 people try to order an item that costs £40 from the shopping channel.

Work out the expected value of sales for that item.

[5 marks]

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Answer £_____

Turn over for the next question

Turn over ▶

6   Lila is going to sell food from a stall on 23 July.

She can sell food at either an agricultural show or a computer fair.

The table shows, for each event, the fee that Lila has to pay and her expected takings, based on sales in previous years.

In the last 10 years it has rained on 93 out of 310 days in July.

Event	Fee	Expected takings
Computer fair	£200	£450
Agricultural show	£800	£600 if it rains
		£1500 if it does not rain

6 (a)   At which event should Lila expect to make the greater profit?
You **must** show working to justify your answer.

[6 marks]

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6 (b) If Lila decides to sell food at the agricultural show she can buy rain insurance.

The insurance costs £100

If Lila buys the insurance and it rains on 23 July she will receive a payment of £300

Give a reason why Lila should **not** buy the insurance.
You **must** show working to justify your answer.

[3 marks]

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Turn over for the next question

Turn over ▶

7 Dan and his friends are planning a one-day music festival.

They have divided the work into a number of activities.

The table below shows

- the activities
- the immediate predecessors of each activity
- the number of days needed to complete each activity.

Task	Activity	Immediate predecessors	Number of days
A	Choose and book the venue	–	3
B	Apply for a licence	A	21
C	Book musicians	B	20
D	Make publicity material	C	5
E	Print and give out flyers	D	2
F	Print tickets	B	3
G	Advertise on social media	D	1
H	Sell tickets	E, F, G	10
I	Organise transport and hospitality	C	15
J	Book food stalls	B	10
K	Prepare the venue	J	5
L	Hold the festival	H, I, K	1

7 (a) Construct an activity network for this project.

Show the earliest start time and latest finish time for each activity.

[10 marks]

Question 7 continues on the next page

Turn over ▶

7 (b) List the critical path.

[1 mark]

Answer _____

7 (c) Dan finds out that organising transport and hospitality takes 20 days instead of 15 days.

Work out the new minimum completion time for the project.

[3 marks]

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Answer _____ days

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