

Total marks — 35
Attempt ALL questions

1. A restaurant can buy long grain rice in two sizes of bags.

- A 9 kg bag costs £25.65
- A 20 kg bag costs £57.20

Which size of bag is better value for the restaurant?

Use your working to justify your answer.

3

2. Aneesha and Brian are playing a board game. Each move is determined by rolling two dice.



Aneesha requires a total of **10 or more** on her next roll to win the game.

What is the probability of Aneesha winning the game on the next roll?

Give your answer as a fraction.

3

[Turn over



3. Gary lives in Biggar and has to go to a meeting in Edinburgh.
 He plans to travel to his meeting by bus.
 He uses this bus timetable to plan his journey.

Dumfries ● Biggar ● Edinburgh												
Monday to Friday												
Route Number	101	101	101	101	101	102	101	101	101	101	101	102
Dumfries Whitesands Stance 4	0535	0710			0910	1025				1315		1815
Heathhall	0543	0720			0920					1325		
Amisfield Main Rd	0547	0725			0925					1330		
Parkgate	0552	0730			0930					1335		
St Ann's	0557	0736			0936					1341		
Beattock Primary School	0606	0745			0945					1350		
Moffat High St Stance 2	0612	0752			0952					1357		
Hollywood						1031						1821
Auldgirth						1039						1829
Closeburn						1046						1836
Thornhill Cross						1050						1840
Durisdiermill						1100						1850
Troloss						1105						1855
Elvanfoot						1117						1907
Crawford	0633	0813			1013	1128				1418		1913
Abington Village	0640	0820			1020	1135				1425		1920
Abington Service Area	0646	0827			1027	1142				1432		1927
Roberton	0651	0832			1032	1147				1437		1932
Lamington	0657	0838			1038	1153				1443		1938
Coulter	0702	0843			1043	1158				1448		1943
Biggar	0633	0709	0853	0953	1053	1208	1253	1353	1458	1623	1803	1953
Dolphinton	0644	0721	0905	1004	1104	1219	1304	1404	1509	1634	1814	2004
West Linton	0651	0731	0915	1011	1111	1226	1311	1411	1516	1641	1821	2011
Carlops	0655	0735	0920	1015	1115	1230	1315	1415	1520	1645	1825	2015
Silverburn	0702	0741	0927	1021	1121	1236	1321	1421	1526	1651	1831	2021
Penicuik Town Centre Stop C	0707		0932	1026		1241	1326	1426		1656	1836	2026
Flotterstone	0717	0746	0942	1036	1126	1251	1336	1436	1531	1706	1846	2034
Fairmilehead, Swanston Drive	0724	0753	0948	1042	1132	1257	1342	1442	1537	1712	1852	2039
Morningside Station	0732	0801	0956	1050	1140	1305	1350	1450	1545	1720	1900	2045
Tollcross	0740	0809	1004	1058	1148	1313	1358	1458	1553	1728	1908	2050
Lothian Road, Caledonian Hotel	0749	0818	1011	1104	1154	1319	1404	1504	1600	1735	1914	2055
Edinburgh Bus Stance E	0801	0830	1021	1114	1204	1329	1414	1514	1611	1745	1924	2102

His meeting in Edinburgh starts at 11:30 am.

It will take him 25 minutes to walk from the Edinburgh bus stance to his meeting.

What is the latest bus he can catch in Biggar to be at his meeting on time?

2



* X 7 4 4 7 5 0 1 0 4 *

4. Seonaid is saving up to buy a tablet computer costing £388.
She earns £7·30 per hour and works for 30 hours each week.
Seonaid is paid at the end of each week.
She pays £5·32 in Income Tax and £7·68 in National Insurance each week.
Her living expenses are £86 per week.
Seonaid saves **half** of the money that she has left each week towards the tablet computer.
How many weeks will it take her to save up enough money to buy the computer?

3

[Turn over



* X 7 4 4 7 5 0 1 0 5 *

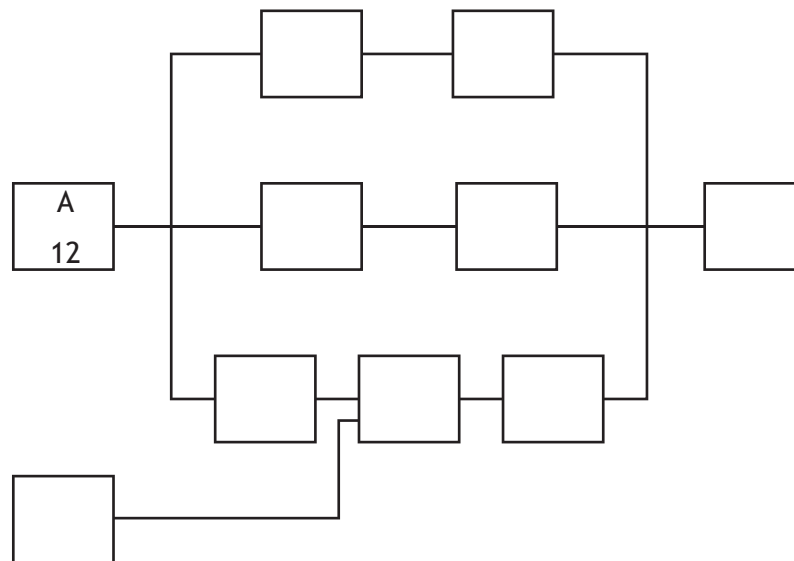
5. A computer company is researching how long it would take to develop a new games console and bring it to market.

The following table of necessary tasks was produced.

Activity	Description	Preceding Task	Time (months)
A	Product design	None	12
B	Market research	None	2
C	Production analysis	A	3
D	Product model	A	4
E	Sales brochure	A	1
F	Product testing	D	5
G	Cost analysis	C	3
H	Sales training	B,E	2
I	Pricing	H	1
J	Project report	F,G,I	1

- (a) Complete the diagram below to show the tasks and times in the boxes.
(An additional diagram, if required, can be found on Page 12).

2



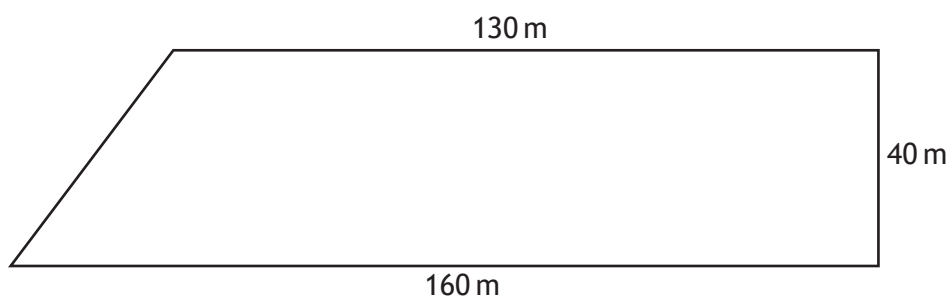
- (b) The company want this entire process to be completed in 2 years.
Based on the times given, is this possible?
Show working to justify your answer.

2

MARKS

DO NOT
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MARGIN

6. A farmer needs to **completely enclose** this field with a new fence.



The fence is only sold in 80 metre rolls.

Each roll costs £73.99.

Calculate the cost of the new fence.

5

[Turn over



* X 7 4 4 7 5 0 1 0 7 *

7. The table below shows the vehicle tax to be paid on different vehicles.

The amount of vehicle tax paid depends on the CO₂ emissions of the vehicle and the fuel type.

Standard Rates – The following table contains the rates of vehicle tax for already registered cars, based on CO₂ emissions and fuel type.

		Petrol Car (Tax Class 48) and Diesel Car (Tax Class 49)				
		Non Direct Debit		Direct Debit		
Bands	CO ₂ emission figure (g/km)	12 months	Six months	Single 12 month payment	Total payable by 12 monthly instalments	Single six month payment
Band A	Up to 100	£0	–	–	–	–
Band B	101 to 110	£20	–	£20	£21	–
Band C	111 to 120	£30	–	£30	£31·50	–
Band D	121 to 130	£110	£60·50	£110	£115·50	£57·75
Band E	131 to 140	£130	£71·50	£130	£136·50	£68·25
Band F	141 to 150	£145	£79·75	£145	£152·25	£76·13
Band G	151 to 165	£180	£99	£180	£189	£94·50
Band H	166 to 175	£205	£112·75	£205	£215·25	£107·63
Band I	176 to 185	£225	£123·75	£225	£236·25	£118·13
Band J	186 to 200	£265	£145·75	£265	£278·25	£139·13
Band K	201 to 225	£290	£159·50	£290	£304·50	£152·25
Band L	226 to 255	£490	£269·50	£490	£514·50	£257·25
Band M	Over 255	£505	£277·75	£505	£530·25	£265·13

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Tom buys a **petrol** car which has a CO₂ emission figure of 142 g/km.

Tom decides to pay his vehicle tax by direct debit in two single six month payments.

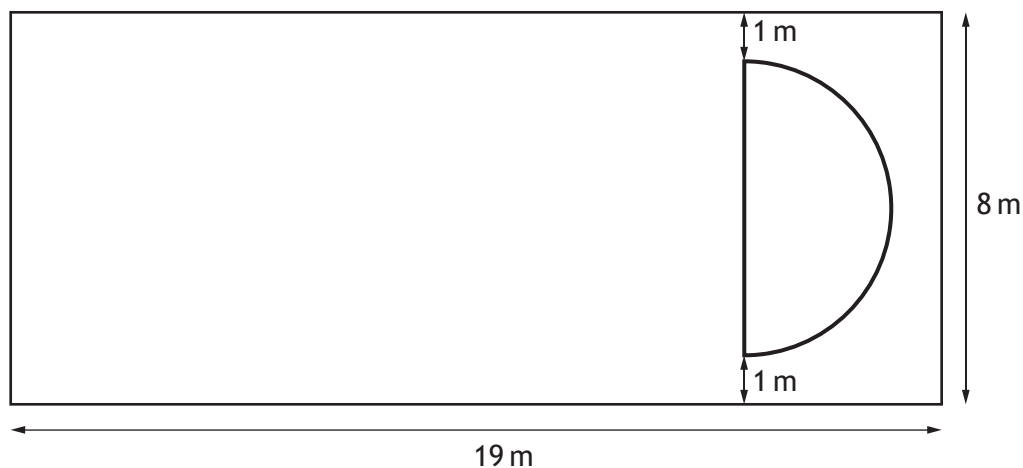
How much more expensive is this than a single 12 month payment by direct debit?

3



* X 7 4 4 7 5 0 1 0 8 *

8. A new playground is planned for Aberbeath Primary School.
 It will be a rectangle measuring 19 metres by 8 metres.
 A semi-circular sandpit will be built within the playground as shown



The playground, excluding the sandpit, is to be covered in rubber tiles.
 Calculate the area to be covered by the rubber tiles.

Take $\pi = 3.14$.

Give your answer to **3 significant figures**.

4

[Turn over



9. A picture is glued onto a piece of card as shown.



- The picture is a rectangle with dimensions 4 cm by 5 cm.
- The rectangular card has an **area** 2.8 times greater than the **area** of the picture.
- One of the dimensions of the piece of card is 7 cm.

Calculate the other dimension of the piece of card.

3



10. Bradley decides to cycle from Kilsyth to the highest point of Tak-Ma-Doon Road.

- The horizontal distance between these two places is 4.5 kilometres.
- Kilsyth is 70 metres above sea level.
- The highest point of Tak-Ma-Doon Road is 320 metres above sea level.

(a) Calculate the average gradient between Kilsyth and the highest point of Tak-Ma-Doon Road.

Give your answer as a fraction in its simplest form.

3

(b) One part of the road has gradient $\frac{2}{25}$.
Is this steeper than the average gradient?

You must justify your answer.

2

[END OF QUESTION PAPER]



* X 7 4 4 7 5 0 1 1 1 *

Total marks — 55
 Attempt ALL questions

1. The population of Scotland is recorded to the nearest hundred.

In 2014, the population was 5 347 600.

In 2015, the population was 5 369 000.

(a) Show that the percentage growth in population from 2014 to 2015 was 0.4%.

2

(b) If the population continues to grow at the same rate, calculate the expected population in 2018.

Give your answer to the nearest hundred.

3

[Turn over



* X 7 4 4 7 5 0 2 0 3 *

MARKS

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2. Chris flew from Perth, Australia, to London, United Kingdom, on Saturday 9th January 2016.

- The plane left Perth, Australia, at 13:05.
- The total journey time, including a stopover in Dubai, is 20 hours and 25 minutes.
- Perth time is 8 hours ahead of London.

At what time did the plane land in London?

2



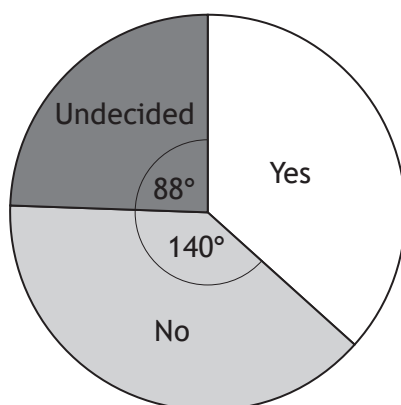
* X 7 4 4 7 5 0 2 0 4 *

3. In September 2014 there was a referendum to determine the future of Scotland.

An opinion poll was taken in December 2013.

The question asked was "Should Scotland be an independent country?"

The results are shown in the pie chart below.



Another opinion poll was taken in April 2014.

1208 people were asked the same question as in December 2013.

The results of this poll are shown in the table below.

YES	NO	UNDECIDED
447	616	145

Compare the two opinion polls and make one relevant comment on the differences between them.

3

[Turn over



* X 7 4 4 7 5 0 2 0 5 *

4. Alison and Michael are travelling to Inverie on Knoydart for a holiday. They must take a ferry from Mallaig to Inverie
- (a) The direct distance from Mallaig to Inverie is 9.8 kilometres.



- (i) Calculate the scale used in the diagram above.

1

- (ii)



The ferry leaves Mallaig and travels North for 0.6 km .

The ferry then changes direction to sail directly to Inverie.

Use the second diagram to find the bearing and distance, in kilometres, that the ferry must travel on the **second part** of its journey.

2



MARKS

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4. (continued)

- (b) The average speed of the ferry from Mallaig to Inverie is 24 ± 3 kilometres per hour depending on tide and weather.

What is the shortest time that the **complete** ferry journey might take?

Give your answer to the **nearest minute**.

3

[Turn over



* X 7 4 4 7 5 0 2 0 7 *

5. Fiona is planning to stay in New York, USA, for three days. She researches the cost of various attractions.

MARKS DO NOT WRITE IN THIS MARGIN

Attraction	Full price in US Dollars
Empire State Building	\$32
Top of the Rock Observation Deck	\$30
Statue of Liberty Cruise	\$40
9/11 Memorial and Museum	\$24
Waxworks	\$37
One World Observatory	\$32

Fiona will visit all six of these attractions while she is there.

Fiona plans to buy a discount card to reduce the cost of visiting these attractions.

Not all of the attractions are included in all of the cards. Fiona must pay full price for these.

Card 1: NY Card

NY Card

Attractions:

★ Sea and Space Museum ★ ★ Top of the Rock Observation Deck ★
 ★ Museum of Natural History ★ ★ 9/11 Memorial and Museum ★
 ★ Statue of Liberty Cruise ★ ★ Empire State Building ★

★★★★ **Total Cost \$114** ★★★★★

Benefits:

These six attractions can be visited for a single payment of \$114.
 This card can only be used once per attraction.
 It is valid for 30 days from first use.

Card 2: Explore NY Card

Explore NY Card

Attractions:

9/11 Memorial and Museum • Statue of Liberty Cruise
 Museum of Natural History • Sea and Space Museum
 Empire State Building • Top of the Rock Observation Deck
 Waxworks • Carnegie Hall • Rockefeller Centre Tour

Cost for any 3 attractions \$71

Benefits:

This card can be used for any 3 attractions from the list.
 This card can only be used once per attraction.
 It is valid for 30 days from first use.



5. (continued)

MARKS
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Card 3: NY Town Pass

NY Town Pass

80+ attractions are included for one price.
When activated the card is valid for 1, 2, 3 or 5 days.
These must be consecutive days.

Cost	
\$90 1 day pass	\$180 3 day pass
\$140 2 day pass	\$190 5 day pass

Benefits:

All of Fiona's chosen attractions can be visited with this card.

(a) During her three-day visit, Fiona will visit two attractions each day.

Fiona is going to buy one discount card.

(i) Calculate the total cost of all six attractions if Fiona buys Card 1. 2

(ii) Calculate the cheapest price that Fiona could pay for entry to her six chosen attractions. 4

(b) Fiona pays the cheapest price for entry to her six chosen attractions.

She pays before leaving the UK.

The cost is £100.96.

Calculate the exchange rate that Fiona received.

Give your answer correct to **3 decimal places**. 2



6. Fraser tests motorcycle tyres on racing circuits.



On Monday he tested Goodhold tyres.

His lap times, in seconds, are given below.

81.8 81.7 81.6 81.0 80.3 80.2

- (a) For Fraser's times on Goodhold tyres, calculate:

(i) the mean;

1

(ii) the standard deviation.

3



* X 7 4 4 7 5 0 2 1 0 *

6. (continued)

- (b) Fraser then changed to Megagrip tyres and recorded his times for another six laps.

These times produced a mean of 81.6 seconds and standard deviation of 0.65 seconds.

Make two valid comments comparing the two types of tyres.

2

- (c) Another rider completed one lap of the circuit in 81.0 seconds.

The track is 3.6 kilometres long.

Calculate his average speed in kilometres per hour.

3

[Turn over



* X 7 4 4 7 5 0 2 1 1 *

7. Grace works for a company selling fitted kitchens.
 She is paid a basic monthly salary of £500.
 She also receives 5% commission on all her sales above £8000.
 In January Grace sells £23 000 of goods.
 Her monthly deductions are 12% of her gross income.
 Grace writes down her budget for the month.

Rent	£245
Bills	£198
Food	£164
Entertaining	£75

Grace saves any surplus.

(a) Calculate Grace's **net** pay for January. 4

(b) (i) Calculate the surplus that Grace will have for January. 1

(ii) Grace's rent increases to £260 per month.
 Calculate the percentage increase in her rent. 2



7. (continued)

(c) To buy a car Grace needs to borrow £4500.

She wants to repay the loan as soon as possible.

She investigates the cost of the loan from five different lenders.

The table shows the repayments for a £4500 loan.

Lender	12 months	24 months	36 months
Tasko	£413.86	£215.07	£150.60
Bank of Shapes	£418.54	£219.31	£157.42
TMS	£458.83	£260.59	£197.74
Premier Bank	£422.46	£214.74	£159.21
Free Bank	£432.99	£234.15	£170.09

Grace assumes that she will earn the same commission each month.

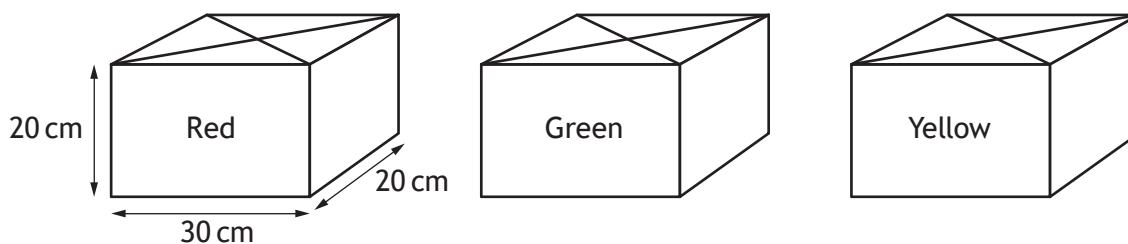
Calculate her **new monthly surplus** and determine from which lender she should take her loan, and over how many months.

2

[Turn over



8. Brendan makes candles from blocks of wax.
Each block of wax is a cuboid measuring 30 cm by 20 cm by 20 cm as shown.



Each candle contains the colours red, green and yellow in the ratio 3 : 1 : 2 respectively.

Each candle is a cube with volume 729 cm^3 .

- (a) Brendan only has 1 block of each colour.
What is the maximum number of candles that he can make?

3

Brendan makes the maximum number of candles.
Any wax that is left over is thrown away.

Each block of wax costs £13.75.

Brendan also buys wicks which cost 18p per candle.

Brendan adds 65% to his costs when calculating the selling price of each candle.

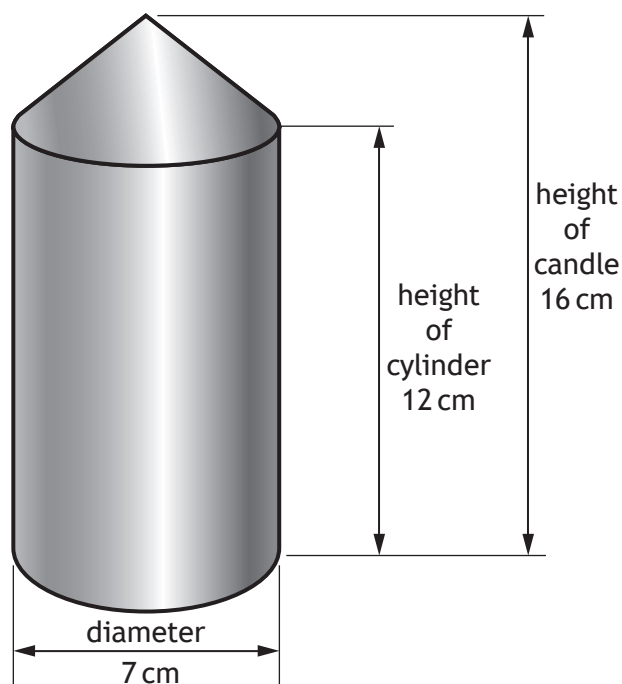
- (b) What is Brendan's selling price for each candle?

3



8. (continued)

Brendan also makes blue candles in the shape of a cylinder with a cone on top as shown.



(c) He buys blue wax in blocks with volume $12\,000\text{ cm}^3$.

Brendan thinks that he can make 25 of these candles from one block of wax.

Is he correct?

Use your working to justify your answer.

7

[END OF QUESTION PAPER]

