Write your name here

Surname	Other names

Pearson Edexcel
Level 1/Level 2 GCSE (9 - 1)

Centre Number | | | | | |

Candidate Number | | | | |

Mathematics AO3

Mathematical problem solving

Silver Test 3

Grades 5-6

Time: 45-60 minutes

Paper Reference
1MA1

You must have: Ruler graduated in centimetres and millimetres, protractor, pair of compasses, pen, HB pencil, eraser.

Total Marks

Instructions

- Use **black** ink or ball-point pen.
- **Fill in the boxes** at the top of this page with your name, centre number and candidate number.
- Answer **all** questions.
- Answer the questions in the spaces provided
  – *there may be more space than you need*.
- **Calculators must not be used in questions marked with an asterisk (*).**
- Diagrams are NOT accurately drawn, unless otherwise indicated.
- You must **show all your working out** with your **answer clearly identified** at the **end of your solution**.

Information

- This silver test is aimed at students targeting grades 5-6.
- This test has 7 questions. The total mark for this paper is 34.
- The marks for **each** question are shown in brackets
  – *use this as a guide as to how much time to spend on each question*.

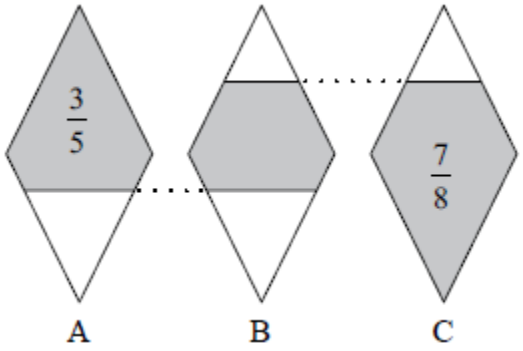
Advice

- Read each question carefully before you start to answer it.
- Keep an eye on the time.
- Try to answer every question.
- Check your answers if you have time at the end.
- This set of problem-solving questions is taken from Edexcel's original set of Specimen Assessment Materials, since replaced.

***1.** The diagram shows three identical shapes A, B and C.

$\frac{3}{5}$ of shape A is shaded.

$\frac{7}{8}$ of shape C is shaded.



(a) What fraction of shape A is unshaded?

……..

(1)

(b) What fraction of shape C is unshaded?

……..

(1)

(c) Use your answers to parts (a) and (b) to work out what fraction of shape B is shaded.

……..

(1)

(Total for Question 1 is 3 marks)

***2.** On a farm, $4\frac{1}{2}$ out of every 15 acres of the land are used to grow crops.

(a) Work out what fraction of the land is used to grow crops.

……..

(1)

Wheat is grown on $\frac{5}{8}$ of the land used to grow crops.

(b) Work out what fraction of the land is used to grow wheat.

……..

(1)

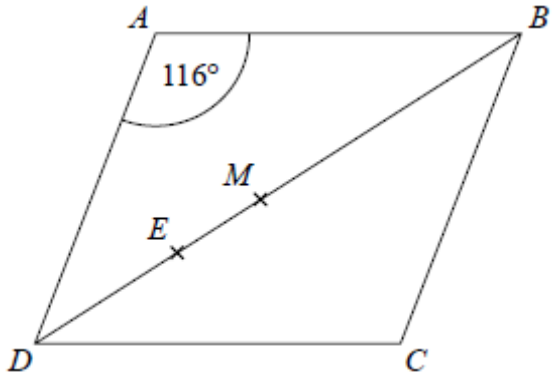
(c) Thus work out the percentage of the total area of the land on the farm that is used to grow wheat.

……..

(1)

(Total for Question 2 is 3 marks)

3.



ABCD is a rhombus.
M is the midpoint of *BD*.
E is the point on *BD* such that *DE* = *CE*.

(a) Find the size of angle *DCB* and thus the size of the angle *MCB*.

$\angle DCB$ = ……°

$\angle MCB$ = ……°

(1)

(b) Use a property of the triangle *ABD* to find the size of angle *ADB* and thus find the size of angle *EDC*.

$\angle ADB$ = ……°

$\angle EDC$ = ……°

(1)

(f) Use a property of the triangle *CDE* to find the size of angle *DCE*.

$\angle DCE$ = ……°

(g) Thus calculate the size of angle *MCE*.

$\angle MCE$ = ……°

(1)

(Total for Question 3 is 3 marks)

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4. A school has a biathlon competition.
Each athlete has to throw a javelin and run 200 metres.

(*a*) The points scored for throwing a javelin are worked out using the formula

$$P_1 = 16(D - 3.8)$$

where P_1 is the number of points scored when the javelin is thrown a distance D metres.

(i) Lottie throws the javelin a distance of 42 metres.

Substitute the correct value into the equation above to calculate how many points Lottie scores.

P_1 = ……..

(2)

(ii) Ingrid scores 584 points for throwing the javelin.

Substitute the correct value into equation to work out the distance that the javelin was thrown by Ingrid.

D = ……..

(2)

The points scored for running 200 metres are worked out using the formula

$$P_2 = 5(42.5 - T)^2$$

where P_2 is the number of points scored when the time taken to run 200 metres is T seconds.

Suha scores 1280 points in the 200 metres.

(*b*) (i) Substitute the correct values into the equation to work out the time, in seconds, it took Suha to run 200 metres.

T = ……..

(2)

The formula for the number of points scored in the 200 metres should not be used for $T > n$.

(ii) State the value of n.

n = ……..

(2)

Give a reason for your answer.

...……..

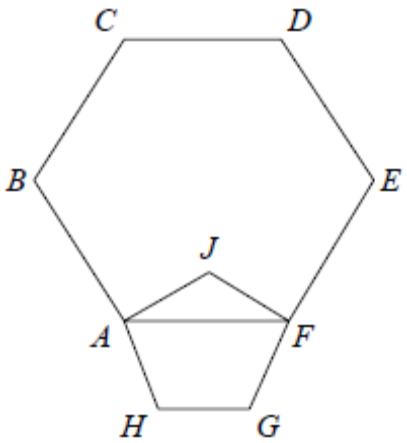
...……..

(2)

(Total for Question 4 is 8 marks)

***5.** *ABCDEF* is a regular hexagon.

AJFGH is a regular pentagon.



(a) Work out the size of the angle *AJF*.

……..

(1)

(b) Work out the size of the angle *BAF*.

……..

(1)

(c) Work out the size of angle *JAF*.

……..

(1)

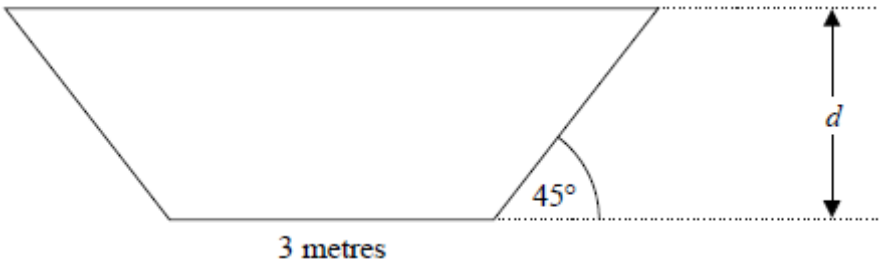
(d) Use your answers to parts (b) and (c) to work out the size of angle *BAJ*.

……..

(1)

(Total for Question 5 is 4 marks)

6. The diagram shows the cross-section of the water in a drainage channel.



The cross-section is in the shape of a trapezium with one line of symmetry.

The base of the drainage channel is horizontal.
The two equal sides of the trapezium are each inclined at 45° to the horizontal.

The length of the base of the trapezium is 3 metres.
The depth of the water is d metres.

(a) Using the formula for the area of a trapezium, write a formula for A in terms of d.
Give your answer in its simplest form.

.....

(3)

The depth of the water in the drainage channel is 1.5 metres.

(b) Find the area of the cross-section of the water.

(2)

The water flows along the drainage channel at a rate of 486 000 litres per minute.
The depth of the water is constant.

(c) Convert 486 000 litres per minute to litres per second.

…….. litres per second
(1)

(d) Convert your answer to part (c) into m^3.

…….. m^3
(1)

(e) Work out the speed of the water.

…….metres per second
(2)

(Total for Question 6 is 9 marks)

***7.** Ishmael is a salesperson for a company.

His monthly wage is made up of his fixed basic wage plus commission.
His commission for a month is a fixed percentage of the sales he makes that month.

The table gives some information about his monthly wages.

Month	**Monthly wage**	**Sales (£)**
June	1700	20 000
July	2200	30 000
August	2050	27 000

(a) Use the information in the table to set up two simultaneous equations for Ishamel's monthly wages in June and July.

1700 = ……..

2200 = ……...

(c) Solve these equations to find out the fixed percentage of sales Ishmael makes each month and thus his basic wage.

fixed percentage = ……..%
(1)

basic wage = £……..
(1)

In September, Ishmael's monthly wage was £1850.

(d) Work out his sales, in £, for September.

……..
(1)

(Total for Question 7 is 4 marks)

TOTAL FOR PAPER IS 34 MARKS

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Question	Working	Answer	Mark	AO	Notes
*1	Shaded area in B $= 1-\frac{2}{5}-\frac{1}{8}$ **or** $\frac{3}{5}-\frac{1}{8}$	$\frac{19}{40}$	P P A	3.1b 3.1b 1.3b	P1 for strategy to start to solve problem, e.g. $1-\frac{3}{5}$ **or** $1-\frac{7}{8}$ **or** correct equation, e.g. $x+\frac{1}{8}=\frac{3}{5}$ P1 for setting up a calculation that will lead to the correct answer, e.g. $1-\frac{2}{5}-\frac{1}{8}$ **or** $\frac{3}{5}-\frac{1}{8}$ **or** $\frac{7}{8}-\frac{2}{5}$ A1 cao
*2	$\frac{4.5}{15}\times\frac{5}{8}=\frac{22.5}{120}$ $\frac{22.5}{120}\times 100$	18.75 (%)	P P A	3.1d 3.1d 1.3b	P1 for process to find amount of amount of land for wheat, e.g. $\frac{4.5}{15}\times\frac{5}{8}$ P1 for complete process, e.g. $\frac{22.5}{120}\times 100$ A1 18.75 oe
3		26°	P P A	3.1b 3.1b 1.3b	P1 for a correct process that leads to angle EDC, e.g. (180° – 116°) ÷ 2 P1 for a correct process that leads to angle MCE, e.g. (58° – 32°) A1 cao

Question	Working	Answer	Mark	AO	Notes
4 (a) (i)		611.2	M	1.3a	M1 for 16 × (42 – 3.8)
			A	1.3a	A1 for 611 (accept 611.2)
(ii)		40.3 m	M	1.3b	M1 for a fully correct method to find distance by applying the correct inverse operations in the correct order
			A	1.3b	A1 for 40.3 m
*5		84°	P	3.1b	P1 for process to find size of interior angle of hexagon or pentagon
			P	3.1b	P1 for establishing a correct process to find angle *JAF*, e.g. *JAF* = (180 − 108) ÷ 2
			P	3.1b	P1 for a complete process to find angle BAJ
			A	1.3b	A1 cao
6 (a)	Width of surface = $d + d + 3$ Area of cross-section = $\frac{d}{2}(d + d + 3 + 3)$	$A = d(d + 3)$	P	3.1b	P1 for correct process to find width of surface
			P	3.1b	P1 for correct process to find cross-sectional area, e.g. $\frac{d}{2}(d + d + 3 + 3)$
			A	1.3b	A1 for $A = d(d + 3)$ or $A = d^2 + 3d$

Question	Working	Answer	Mark	AO	Notes
6 (b)	$A = 1.5(1.5 + 3)$	6.75 m^2	M A	1.3a 1.3a	M1 for substitution of 1.5 in formula or a complete method starting again A1 for 6.75
(c)	486000 ÷ 60 = 8100 8100 L = 8.1 m^3 8.1 ÷ 6.75	1.2 m/s	P P P A	3.1d 3.1d 3.1d 1.3b	P1 for a correct process to convert rate to per second, e.g. 486 000 ÷ 60 (= 8100) P1 for process to convert to m3, e.g." 8100" ÷ 1000 P1 for process to convert litres/min to m/s, e.g. "8.1" ÷ ".75" A1 cao
7	**Method 1** 2200 − 1700 = 500 30000 − 0000 = 10000 For every £100 increase in wage the increase in sales = £2000 1850 − 1700 = 150 Difference in sales = 1.5× 2000 = 3000 20000 + 3000	23000	P P P A	2.3a 3.1d 3.1d 1.3b	P1 for process to interpret information, e.g. 2200 – 1700 = 500 oe or use $y = mx + c$ or start to draw graph P1 for process to build on initial strategy, e.g. 2200 − 1700 = 500 and 30000 − 20000 = 10000 oe use proportional increase or process to find m and c P1 for strategy to use found information, e.g. 1000 ÷ 5 or use values of m and c or use straight line graph A1 cao

Question	Working	Answer	Mark	AO	Notes
	Method 2 Use $y = mx + c$ $1700 = 20000m + c$ $2200 = 30000m + c$ $m = \frac{2200 - 1700}{30000 - 20000} = 0.05$ $c = 2200 - 30000 \times 0.05 = 700$ When $y = 1850$, $x = \frac{1850 - 700}{0.05}$ **Method 3** Draw a graph				