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GCSE Maths Focus on:

A02 exam questions

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Activities booklet

Contents	Page
What is AO2?	4
Which strand of AO2 is being assessed?	5
AO2 in the curriculum	12
Exploring the strands of AO2 further	13

AQA Education (AQA) is a registered charity (number 1073334) and a company limited by guarantee registered in England and Wales (number 3644723). Our registered address is AQA, Devas Street, Manchester M15 6EX.

What is AO2?

Activity 1

Using the Ofqual strands for AO2 (Handout booklet), read the different strands and elements and highlight the skills students need to develop in lessons.

You may wish to annotate the table provided in the Handout booklet, or make notes below.

Notes

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What strand of AO2 is being assessed?

Activity 2

Using the Ofqual strand document from Activity 1, identify which strand these questions are targeting.

Practice Paper Set 1 Paper 3 Foundation Tier

30 In the diagram, *DC* is parallel to *AB*.

Show that triangle *ABD* is isosceles.

[3 marks]

7 The table shows the number of Year 11 students who were absent in one week.

	Monday	Tuesday	Wednesday	Thursday	Friday
Number absent	14	13	11	15	16

Jack uses this information to draw a bar chart.

Write down two mistakes that he has made.

[2 marks]

Practice Paper Set 1 Paper 1 Foundation Tier

4 The table shows how 25 students travel to school.

Walk	Bus	Car	Taxi
9	8	7	1

Draw a bar chart to show this information.

[4 marks]

Practice Paper Set 1 Paper 1 Foundation Tier

18 Liam says,

"If you divide any multiple of 10 by 2 the answer **always** ends in 5"

Is he correct?

Write down a calculation to support your answer.

[1 mark]

24 Polygon *ABCDE* is divided into triangles as shown.

Not drawn accurately

Use the triangles to work out the sum of the interior angles of polygon *ABCDE*.

You **must** show your working.

[2 marks]

Practice Paper Set 1 Paper 1 Higher Tier

Please note, we will be looking at Q5 (c).

5 The scatter graph shows the number of driving lessons and the number of tests needed to pass by 10 people.

5 (c) Meera says,

> "I can use the trend to predict the number of driving tests needed to pass for any number of driving lessons."

Comment on her statement.

[1 mark]

Practice Paper Set 1 Paper 1 Higher Tier

24 A bag contains n beads.
One bead is black and the rest are white.
Two beads are taken from the bag at random.

24 (a) Show that the probability that both beads are white is $\frac{n-2}{n}$

[2 marks]

Practice Paper Set 1 Paper 1 Higher Tier

25 $ABCD$ is a parallelogram.
ABE is a straight line and $AB : BE = 3 : 2$
BC and ED intersect at F.

$\overrightarrow{AB} = \mathbf{a}$ and $\overrightarrow{AD} = \mathbf{b}$

Not drawn accurately

25 (b) Deduce $\overrightarrow{EF}$ in terms of **a** and **b**.

[2 marks]

Practice Paper Set 1 Paper 3 Higher Tier

19 In the UK in 2000

25% of the population were under 24 years old
50% of the population were under 37 years old
the inter-quartile range of the ages was 32 years
the oldest person was 107 years old.

19 (a) Show the information on a box plot.

[3 marks]

Practice Paper Set 1 Paper 3 Higher Tier

21 Mersenne primes are prime numbers that can be written in the form

$2^n - 1$ where n is a whole number.

For example, 3 can be written as $2^2 - 1$

21 (a) Prove that $2^9 - 1$ is not a Mersenne prime.

[2 marks]

AO2 in the Curriculum

Activity 3 (Group Discussion): Notes

Do you think the teaching time allocated to this skill reflects this?

Do you think your students are developing their AO2 skills as they progress from KS3 to KS4?

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Exploring the Strands of AO2 Further

Activity 4

AO2.1a: Practice Paper Set 1 Paper 1 Foundation Tier

11 Here is a centimetre grid.

A (3, 5), *B* (0, –3) and *C* (–5, 2) are three points.

What type of triangle is *ABC*?

You **must** show your working, which may be on the diagram.

[2 marks]

AO2.1a: Practice Paper Set 1 Paper 1 Foundation and Higher (Q9)

25 Alan, Ben and Carl ran a 1000 metre race.

The distance-time graph shows the race.

25 (a) Who won the race?

Give a reason for your answer.

[1 mark]

Answer _____

Reason _____

AO2.1a: Practice Paper Set 1 Paper 3 Higher

4 The ratio of $x : y$ is $2 : 3$

Circle the correct statement.

[1 mark]

x is $\frac{2}{3}$ of y $\quad$ y is $\frac{2}{3}$ of x $\quad$ x is $\frac{2}{5}$ of y $\quad$ y is $\frac{3}{5}$ of x

AO2.1b: Practice Paper Set 1 -Paper 2 Foundation

10

Use the height of the man to estimate the height of the pylon.

[2 marks]

AO2.1b: Practice Paper Set 1 -Paper 3 Foundation and Higher (7a)

23 Here is an ordinary dice.

23 (a) Ali is going to throw the dice six times.

He says,

"I will get one of each number."

Give a reason why he could be wrong.

[1 mark]

9 Jack makes a game for a school fair.
Players can win money by picking a 'Win' ticket from a tub.
A player chooses a tub by picking a blue disc or a red disc out of a bag.

400 people play the game at the fair.
The frequency tree shows some of the outcomes.

9 (a) Complete the frequency tree.

[2 marks]

9 (b) A player has one go at Jack's game.

Use the frequency tree to estimate the probability that the player wins some money.

[2 marks]

AO2.1b: Practice Paper Set 2 Paper 2 Higher

21 The speed of 50 vehicles was measured travelling along a road.

Speed, s (mph)	Number of cars
$0 < s \leqslant 40$	2
$40 < s \leqslant 60$	11
$60 < s \leqslant 75$	24
$75 < s \leqslant 90$	9
$90 < s$	4

21 (a) Every driver travelling at more than 70 mph is fined £60

On average, 8400 drivers use the road each day.

Estimate the total amount of money raised from fines on the road each day.

[3 marks]

AO2.2: Practice Paper Set 1 Paper 2 Foundation Tier

18 I am thinking of a prime number.

Its digits add up to a square number.

Write down a prime number that I could be thinking of.

[2 marks]

AO2.2: Practice Paper Set 2 Paper 3 Foundation Tier

8 *A*, *B* and *C* are three vertices of a quadrilateral plotted on a centimetre grid.

8 (a) Plot *D* on the grid so that *ABCD* is a rectangle.

[1 mark]

AO2.2: Practice Paper Set 1 Paper 2 Higher Tier

24 Show that $\frac{2w+4}{w^2-25} \times \frac{w+5}{w^2+3w+2} \times (3w^2 - 16w + 5)$

simplifies to $\frac{aw+b}{cw+d}$ where a, b, c and d are integers.

[5 marks]

AO2.2: Practice Paper Set 1 Paper 3 Higher Tier

26 For all values of x, $f(x) = x^2 + 1$ $g(x) = x - 5$

26 (a) Show that $fg(x) = x^2 - 10x + 26$

[2 marks]

AO2.2: Practice Paper Set 2 Paper 2 Higher Tier

16 The area of a **right-angled, isosceles** triangle is 4 cm^2

Not drawn accurately

Work out the perimeter of the triangle in centimetres.

Give your answer in the form $a + b\sqrt{c}$, where a, b and c are integers.

[4 marks]

AO2.2: Practice Paper Set 1 Paper 1 Higher Tier

12 Write $2(7x + 4) - 4(x + 6) + 1$ in the form $a(bx + c)$

where a, b and c are integers and $a > 1$

[3 marks]

22 Write $\frac{26}{\sqrt{2}} - \frac{12}{\sqrt{18}} + 2\sqrt{50}$ in the form $a\sqrt{2}$ where a is an integer.

[4 marks]

AO2.3a: Practice Paper Set 1 Paper 1 Higher Tier

5 The scatter graph shows the number of driving lessons and the number of tests needed to pass by 10 people.

5 (a) Describe the correlation.

Circle your answer.

[1 mark]

strong positive weak positive weak negative strong negative

5 (b) Use a line of best fit to estimate the number of tests needed to pass by a person who has 50 lessons.

[2 marks]

AO2.3a: Practice Paper Set 1 Paper 1 Foundation Tier (a-c)

23 The scatter graph shows the number of driving lessons and the number of tests needed to pass by 10 people.

23 (a) What proportion of the 10 people passed on their first test?

[1 mark]

Answer _____

23 (b) Describe the correlation.

Circle your answer.

[1 mark]

strong positive weak positive weak negative strong negative

23 (c) Use a line of best fit to estimate the number of tests needed to pass by a person who has 50 lessons.

[2 marks]

AO2.3b: Practice Paper Set 1 Paper 1 Foundation Tier (part b is AO2.3a)

17 Here is some information about a group of children.

	Boys	Girls
Left-handed	3	8
Right-handed	12	20

17 (a) Write down the number of left-handed girls to right-handed girls as a ratio.
Give your answer in its simplest form.

[1 mark]

17 (b) What percentage of the boys are left-handed?

[2 marks]

AO2.3b: Practice Paper Set 1 Paper 1 Foundation and Higher Tier (Q7)

24 A shape is made from rectangles.

24 (a) On the diagram below shade an area represented by the expression ab

[1 mark]

24 (b) On the diagram below shade an area represented by the expression $ad + cd$

[1 mark]

AO2.3b: Practice Paper Set 1 Paper 1 Foundation and Higher Tier (Q7) (Continued)

24 (c) On the diagram below shade the area represented by the expression $d(a + 2c)$

[1 mark]

24 (d) Write down an expression for the area of the whole shape.

[1 mark]

AO2.3a: Practice Paper Set 1 Paper 3 Higher Tier

3 Water is poured into a glass for 4 seconds.

The graph shows the depth of the water in the glass.

What is the rate of change of the depth of the water?

Circle your answer.

[1 mark]

0.4 cm/s 1.25 cm/s 2.5 cm/s 10 cm/s

AO2.3b: Practice Paper Set 1 Paper 2 Higher Tier

18 The table shows the running times of some films.

18 (a) Draw a cumulative frequency graph on the grid opposite to represent the data.

[3 marks]

Time, t (minutes)	Number of films	
$0 \leqslant t < 80$	0	
$80 \leqslant t < 100$	9	
$100 \leqslant t < 120$	35	
$120 \leqslant t < 140$	30	
$140 \leqslant t < 160$	18	
$160 \leqslant t < 180$	8	

AO2.4a: Practice Paper Set 1 Paper 2 Foundation Tier

19 Toilet rolls come in packs of 4 and 9

£1.89 £3.99

Which pack is better value?

You **must** show your working.

[3 marks]

AO2.4a: Practice Paper Set 1 Paper 3 Foundation Tier

15 You are given that

$$a = 3 \quad \text{and} \quad b = 5$$

Tick whether each statement is true or false.

Give a reason for each answer.

[2 marks]

Statement	True	False	Reason
$ab = 35$			
$2b^2 = 100$			

AO2.4a: Practice Paper Set 1 Paper 2 Foundation and Higher (Q6b)

24 The times that 80 customers waited at a supermarket checkout are shown.

Time, t (minutes)	Frequency
$0 \leqslant t < 2$	32
$2 \leqslant t < 4$	19
$4 \leqslant t < 6$	20
$6 \leqslant t < 8$	7
$8 \leqslant t < 10$	2

24 (b) The manager of the supermarket says,

"90% of our customers wait less than 6 minutes."

Does the data support this statement?

You **must** show your working.

[2 marks]

AO2.4a: Practice Paper Set 1 Paper 3 Higher Tier

24 *A*, *B*, *C* and *D* are points on a circle.

Angle *ABC* = 92°
Angle *ACB* = 38°
Angle *ACD* = 50°
Angle *CDE* = 32°

Not drawn accurately

Tick whether each statement is true or false.
Give a reason for each answer.

Statement	True	False
Angle *ADC* = 88°	☐	☐

Reason _____

Statement	True	False
ABCD is a trapezium	☐	☐

Reason _____

Statement	True	False
DE is a tangent to the circle	☐	☐

Reason _____

AO2.4b: Practice Paper Set 2 Paper 3H

21 w, x and y are three integers.

w is 2 less than x

y is 2 more than x

Prove that $wy + 4 = x^2$

[3 marks]

AO2.4b: Practice Paper Set 1 Paper 2H

21 *ABCD* is a parallelogram.

CE = *CF*

Prove that $y = x$

[5 marks]

AO2.5a: Practice Paper Set 1 Paper 2F

8 A game is played with a fair spinner.

The player spins the spinner twice.

The score is the **difference** between the two numbers.

8 (b) The player **loses** if the score is 0 or 1

The player **wins** if the score is 2 or 3

Amy says,

"Two scores win and two scores lose, so the chance of winning is evens."

Is Amy correct?

Tick a box.

Yes ☐ No ☐

Give a reason for your answer.

[2 marks]

AO2.5a: Practice Paper Set 1 Paper 3H

21 Mersenne primes are prime numbers that can be written in the form

$2^n - 1$ where n is a whole number.

For example, 3 can be written as $2^2 - 1$

21 (b) There are Mersenne primes when $n = 5$ and when $n = 7$

Ama says,

"The ratio of the indices is 5 : 7

This means the ratio of the Mersenne primes is 5 : 7"

Show that Ama is wrong.

[1 mark]

AO2.5b: Practice Paper Set 2 Paper 3F

13 Guy is using this table of results to draw the graph of $y = x + 1$ for values of x from 0 to 10

x	0	5	10
y	1	6	11

This is his graph.

Write down three different mistakes he has made.

[3 marks]

AO2.5b: Practice Paper Set 1 Paper 2H

17 Joe asked 230 students how long it took them to travel to school.

The results are shown in the table.

Travelling time, t (minutes)	Number of students
$0 < t \leqslant 5$	44
$5 < t \leqslant 10$	50
$10 < t \leqslant 20$	54
$20 < t \leqslant 30$	37
$30 < t \leqslant 60$	45

This is Joe's attempt to draw a histogram to show the data.

Notes

Notes

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