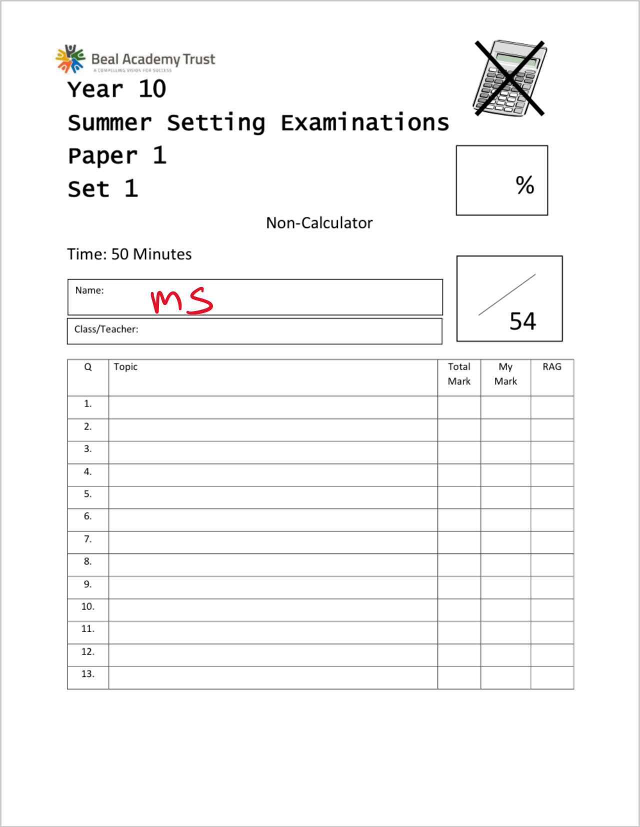
year 10 set 1 nc 2021 may final

Wednesday, 9 June 2021 12:59

year 10 set 1 nc 2021...



Beal Academy Trust

A COMPELLING VISION FOR SUCCESS

Year 10

Summer Setting Examinations

Paper 1

Set 1

%

Non-Calculator

Time: 50 Minutes

Name: ms

Class/Teacher:

/ 54

Q	Topic	Total Mark	My Mark	RAG
1.				
2.				
3.				
4.				
5.				
6.				
7.				
8.				
9.				
10.				
11.				
12.				
13.				

Questions

Q1.

The straight line **L** has equation $4x + y = 7$

Find an equation of the straight line perpendicular to **L** that passes through (–8, 3).

$y = -4x + 7$

✓b1

Perp Grad. $=$ "$\frac{1}{4}$" ✓m1

$3 = \frac{1}{4}(-8) + c$ ✓m1 for subs (dep)

$3 = -2 + c$

$5 = c$

✓a1

$y = \frac{1}{4}x + 5$ ....

(Total for question = 4 marks)

Q2.

(a) Write down the value of $64^{\frac{1}{2}}$

8 ✓a1 ....

(1)

(b) Find the value of $\left(\frac{8}{125}\right)^{-\frac{2}{3}}$

$= \left(\frac{2}{5}\right)^{-2}$

✓m1 for at least one correct step

$= \left(\frac{4}{25}\right)^{-1} = \frac{25}{4}$

$\frac{25}{4}$ ✓a1 ....

(2)

(Total for question = 3 marks)

Q3.

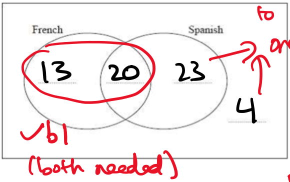
There are 60 students at a college.

20 students study both French and Spanish.
13 students study French but not Spanish.
A total of 43 students study Spanish.

(a) Complete the Venn diagram for this information.

✓m1

correct method



(both needed)

to find at least one of these. e.g. 43-20 or 60-43-13

(3)

✓A1 fully correct diagram

One of the students at the college is to be selected at random.

(b) Write down the probability that this student studies neither French nor Spanish.

....

(1)

(Total for question = 4 marks)

Q4.

(a) Expand and simplify $(x + 2)(2x - 3)(3x + 1)$

✓M1 for 3 out of 4 correct

$= (2x^2 - 3x + 4x - 6)(3x + 1)$

$= (2x^2 + x - 6)(3x + 1)$

$= 6x^3 + 2x^2 + 3x^2 + x - 18x - 6$

✓M1 for 4 out of 6 correct

$= 6x^3 + 5x^2 - 17x - 6$

(3)

✓A1 cao

(b) Simplify $n^4 \div n^{\frac{1}{2}}$

✓A1

$n^{\frac{7}{2}}$ or $n^{3.5}$ oe

(1)

(Total for question = 4 marks)

Q5.

Make *a* the subject of $a + 3 = \dfrac{2a + 7}{r}$

$ar + 3r = 2a + 7$ ✓M1 remove fraction AND expand

$ar - 2a = 7 - 3r$

$a(r-2) = 7-3r$ ✓M1 for isolating 'a' and factorising

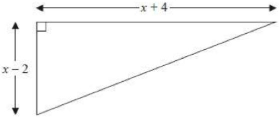
$$a = \frac{7-3r}{r-2}$$

✓A1 cao

....
(Total for question = 3 marks)

Q6.

The diagram shows a right-angled triangle.



All the measurements are in centimetres.

The area of the triangle is 27.5 cm^2

Work out the length of the shortest side of the triangle.
You must show all your working.

$\frac{1}{2}(x-2)(x+4) = 27.5$

✓M1 (can be seen anywhere)

$(x-2)(x+4) = 55$

$x^2 + 2x - 8 = 55$ ✓M1 process to expand + equal to zero

$x^2 + 2x - 63 = 0$

$7-2=5$

$(x-7)(x+9) = 0$

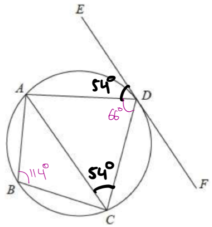
$x = 7$ $x = -9$

✓M1 process to solve quadratic

5 ✓A1 cm CAO

(Total for question = 4 marks)

Q7.



A, *B*, *C* and *D* are points on a circle.
EDF is the tangent to the circle at *D*.

Angle *ADE* = 54°
Angle *ABC* = 114°

Work out the size of angle *CAD*.
You must give a reason for each stage of your working.

ACD = 54 or ACD = 66 ✓B1

(alternate segment theorem or opposite angles in cyclic quadrilateral sum to 180°) ✓C1

180 − 66 − 54 = 60 ✓a1

angles in a triangle sum to 180° ✓C1

.... °

(Total for question = 4 marks)

Q8.

Rationalise the denominator of $\frac{(6-\sqrt{5})(6+\sqrt{5})}{\sqrt{31}}$

Give your answer in its simplest form.

✓m1 for 3 out of for correct.

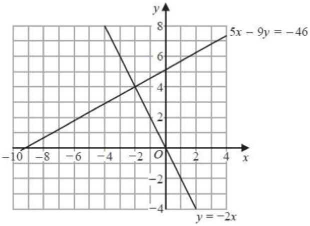
$= \frac{36 - 6\sqrt{5} + 6\sqrt{5} - 5}{\sqrt{31}}$

$= \frac{31}{\sqrt{31}} \frac{\times\sqrt{31}}{\times\sqrt{31}}$ ✓m1 rationalizing

$= \sqrt{31}$ ✓a1 CAO

(Total for Question is 3 marks)

Q9.



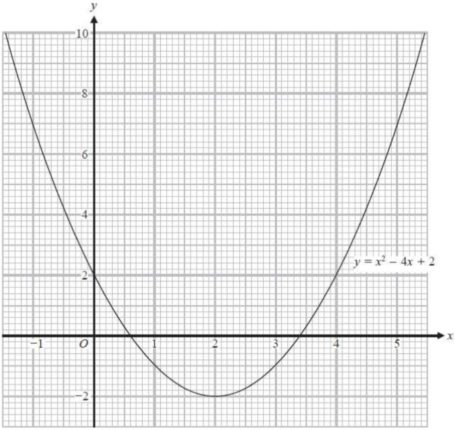
(a) Use these graphs to solve the simultaneous equations

$$5x - 9y = -46$$
$$y = -2x$$

x = −2 ✓a1

y = 4

(1)



(b) Use this graph to find estimates for the solutions of the quadratic equation $x^2 - 4x + 2 = 0$

$x = 0.6$ and $x = 3.4$

✓a1 ✓a1

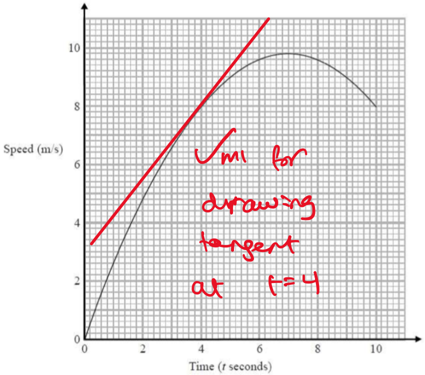
(2)

CAO

(Total for question = 3 marks)

Q10.

Karol runs in a race. The graph shows her speed, in metres per second, *t* seconds after the start of the race.



✓M1 for drawing tangent at t=4

(a) Calculate an estimate for the gradient of the graph when *t* = 4. You must show how you get your answer.

✓M1 for finding gradient using their tangent.

✓A1 for answer in range of 1.0 to 1.3

(b) Describe fully what your answer to part (a) represents.

✓C1 acceleration after 4 seconds ✓C1

(2)

(c) Explain why your answer to part (a) is only an estimate.

accuracy of tangent is not exact

(1)

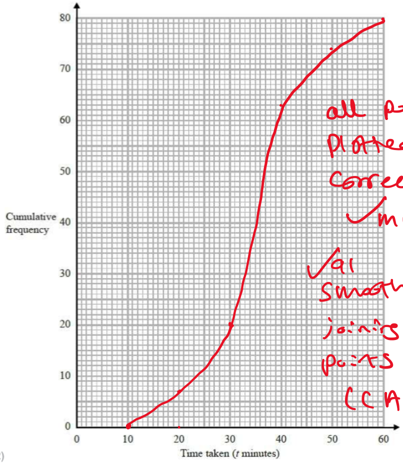
✓C1 oe

(Total for question = 6 marks)

Q11.
The cumulative frequency table gives information about the time, in minutes, Jane took to go from her home to school each day last term.

Time taken (t minutes)	Cumulative frequency
$0 < t \leqslant 10$	0
$0 < t \leqslant 20$	7
$0 < t \leqslant 30$	20
$0 < t \leqslant 40$	64
$0 < t \leqslant 50$	74
$0 < t \leqslant 60$	80

(a) On the grid below, draw a cumulative frequency graph for this information.



all points plotted correctly ✓m1

✓a1 smooth curve joining all points (CAO)

(2)

Jane expects that it should take her x minutes to go from her home to school each day.
On 25% of the days last term, Jane took longer than x minutes to go from her home to school.

(b) Use your cumulative frequency graph to find an estimate for the value of x.

25% of 80 = 20 ✓m1

80 - 20 = 60 ✓m1 for reading from 60 from the graph

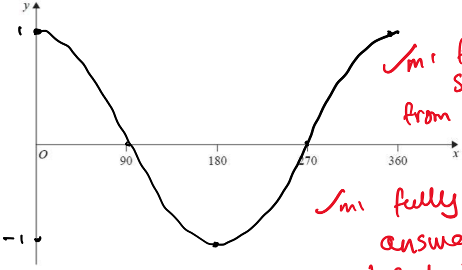
37 - 40
....
✓a1

(3)

(Total for question = 5 marks)

Q12.

(a) Sketch the graph of $y = \cos x°$ for 0° to 360°



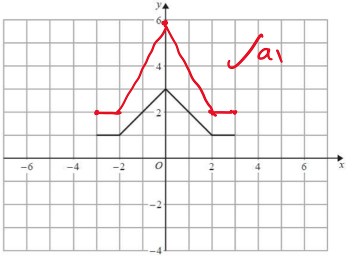
✓m1 for correct shape from 0-360

✓m1 fully correct answer with 1 and -1 labelled

(2)

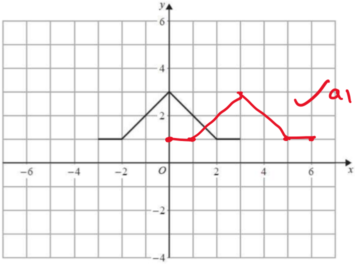
(b) The graph of $y = f(x)$ is shown on both grids below.

(i) On this grid, draw the graph of $y = 2f(x)$



✓a1

(ii) On the grid below, draw the graph of $y = f(x – 3)$



✓a1

(2)

(Total for question = 4 marks)

Q13.

There are *y* black socks and 5 white socks in a drawer.

Joshua takes at random two socks from the drawer.

The probability that Joshua takes one white sock and one black sock is $\frac{6}{11}$

(a) Show that $3y^2 - 28y + 60 = 0$

$$\underbrace{2\left(\frac{y}{y+5} \times \frac{5}{y+4}\right) = \frac{6}{11}}$$

✓M1 if seen anywhere.

✓M1 for fully correct equation

$$\frac{110y}{(y+5)(y+4)} = \frac{6}{11}$$

$110y = 6(y+5)(y+4)$ ✓M1 for eliminating fraction

$110y = 6(y^2 + 9y + 20)$

$110y = 6y^2 + 54y + 120$

$6y^2 - 56y + 120 = 0$

$3y^2 - 28y + 60 = 0$ ✓C1 for fully correct chain of reasoning

(4)

(b) Find the probability that Joshua takes two black socks.

$3y^2 - 28y + 60 = 0$

$(3y-10)(y-6) = 0$ ✓M1 for process to solve

$y = \frac{10}{3}$ $\quad \boxed{y = 6}$ ✓M1 for selecting 6

$\frac{6}{11} \times \frac{5}{10} = \frac{30}{110} = \frac{3}{11}$

✓A1 oe

....

(3)

(Total for question = 7 marks)

---End of Exam---