

Please check the examination details below before entering your candidate information			
Candidate surname		Other names	
Centre Number		Candidate Number	
Pearson Edexcel Level 1/Level 2 GCSE (9–1)			
Aiming for 9 – Spring 2020 practice paper			
Morning (Time: 1 hour 30 minutes)		Paper Reference 1MA1/1H	
Mathematics Paper 1 (Non-Calculator) Higher Tier			
You must have: Ruler graduated in centimetres and millimetres, protractor, pair of compasses, pen, HB pencil, eraser. Tracing paper may be used.			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.*
- You must **show all your working**.
- Diagrams are **NOT** accurately drawn, unless otherwise indicated.
- **Calculators may not be used.**



Information

- The total mark for this paper is 80. There are 20 questions.
- Questions have been arranged in an ascending order of mean difficulty, as found by Grade 7 students in June and November examinations.
- 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.

Answer ALL questions.

Write your answers in the spaces provided.

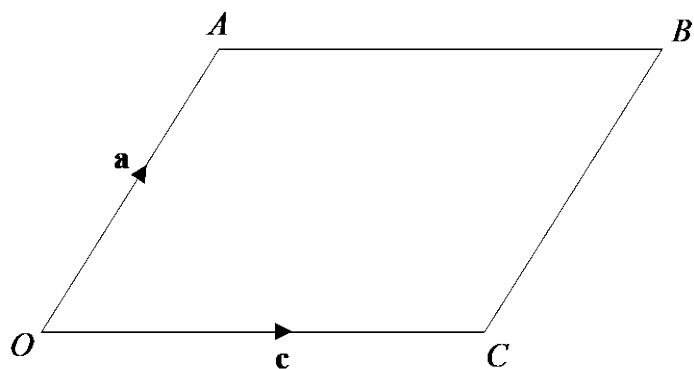
You must write down all the stages in your working.

1 n is an integer.

Prove algebraically that the sum of $\frac{1}{2}n(n+1)$ and $\frac{1}{2}(n+1)(n+2)$ is always a square number.

(Total for Question 1 is 2 marks)

2



$OABC$ is a parallelogram.

$$\vec{OA} = \mathbf{a} \quad \text{and} \quad \vec{OC} = \mathbf{c}$$

X is the midpoint of the line AC .

OCD is a straight line so that $OC : CD = k : 1$

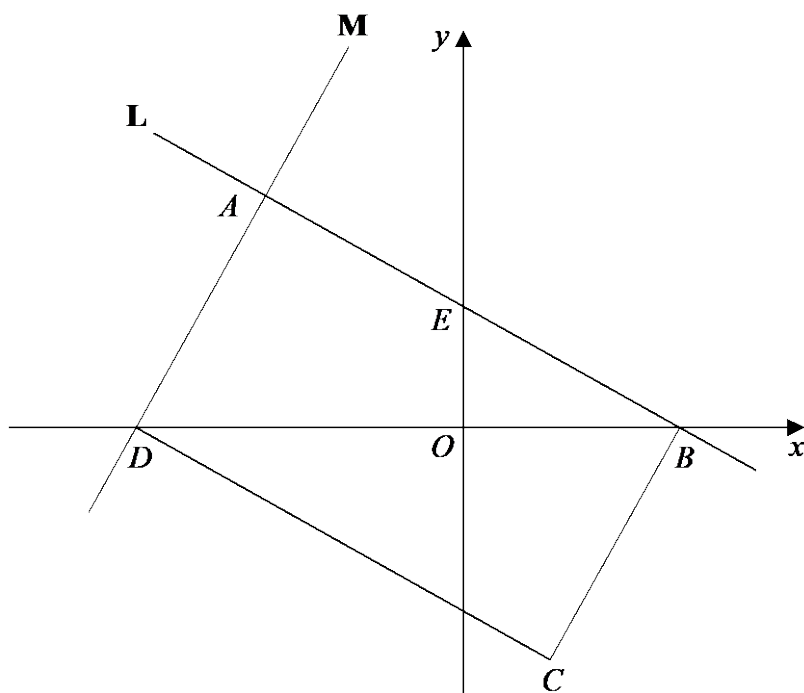
Given that $\vec{XD} = 3\mathbf{c} - \frac{1}{2}\mathbf{a}$

find the value of k .

$$k = \dots\dots\dots$$

(Total for Question 2 is 4 marks)

3



$ABCD$ is a rectangle.

A , E and B are points on the straight line L with equation $x + 2y = 12$

A and D are points on the straight line M .

$$AE = EB$$

Find an equation for M .

.....
(Total for Question 3 is 4 marks)

4 Solve algebraically the simultaneous equations

$$x^2 + y^2 = 25$$

$$y - 3x = 13$$

.....
(Total for Question 4 is 5 marks)

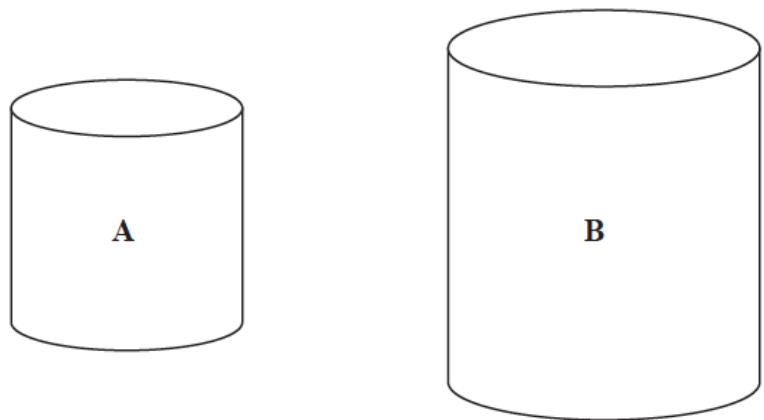
5 Given that

$$x^2 : (3x + 5) = 1 : 2$$

find the possible values of x .

.....
(Total for Question 5 is 4 marks)

6 **A** and **B** are two similar cylindrical containers.



the surface area of container **A** : the surface area of container **B** = 4 : 9

Tyler fills container **A** with water.
She then pours all the water into container **B**.
Tyler repeats this and stops when container **B** is full of water.
Work out the number of times that Tyler fills container **A** with water.
You must show all your working.

.....
(Total for Question 6 is 4 marks)

- 7 White shapes and black shapes are used in a game.
Some of the shapes are circles.
All the other shapes are squares.

The ratio of the number of white shapes to the number of black shapes is 3:7

The ratio of the number of white circles to the number of white squares is 4:5

The ratio of the number of black circles to the number of black squares is 2:5

Work out what fraction of all the shapes are circles.

.....
(Total for Question 7 is 4 marks)

8 Three solid shapes **A**, **B** and **C** are similar.

The surface area of shape **A** is 4 cm^2

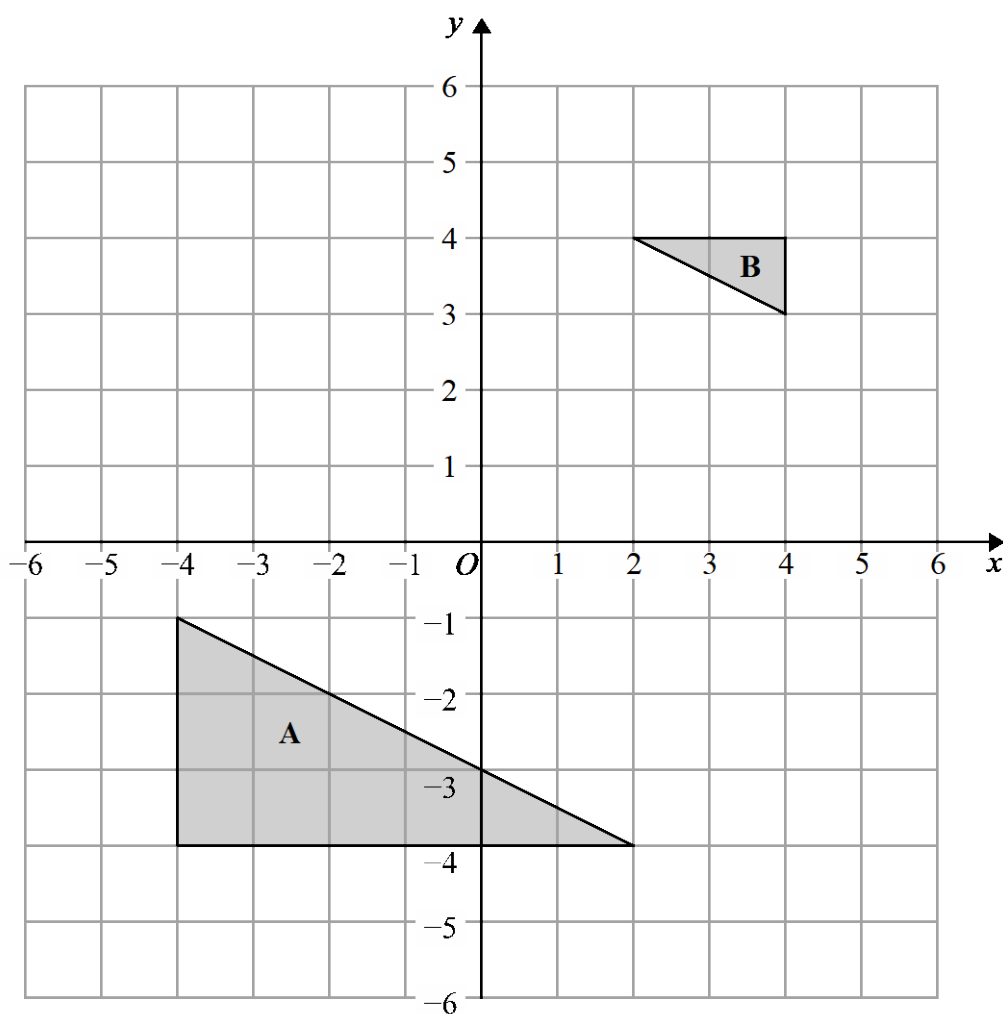
The surface area of shape **B** is 25 cm^2

The ratio of the volume of shape **B** to the volume of shape **C** is $27 : 64$

Work out the ratio of the height of shape **A** to the height of shape **C**.

Give your answer in its simplest form.

.....
(Total for Question 8 is 4 marks)

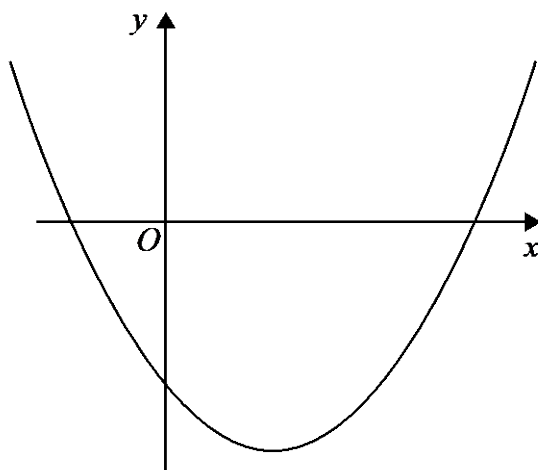


Describe fully the single transformation that maps triangle A onto triangle B.

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(Total for Question 9 is 2 marks)

10 Here is a sketch of a curve.



The equation of the curve is $y = x^2 + ax + b$ where a and b are integers.

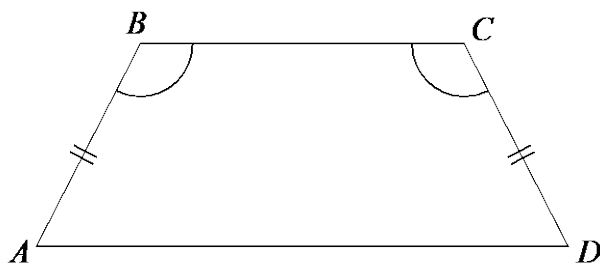
The points $(0, -5)$ and $(5, 0)$ lie on the curve.

Find the coordinates of the turning point of the curve.

(..... ,)

(Total for Question 10 is 4 marks)

- 11 $ABCD$ is a quadrilateral.



$$AB = CD.$$

$$\text{Angle } ABC = \text{angle } BCD.$$

Prove that $AC = BD$.

(Total for Question 11 is 4 marks)

12 Sketch the graph of

$$y = 2x^2 - 8x - 5$$

showing the coordinates of the turning point and the exact coordinates of any intercepts with the coordinate axes.

(Total for Question 12 is 5 marks)

- 13 Given that n can be any integer such that $n > 1$, prove that $n^2 - n$ is never an odd number.

(Total for Question 13 is 2 marks)

- 14 The table shows some values of x and y that satisfy the equation $y = a \cos x^\circ + b$

x	0	30	60	90	120	150	180
y	3	$1 + \sqrt{3}$	2	1	0	$1 - \sqrt{3}$	-1

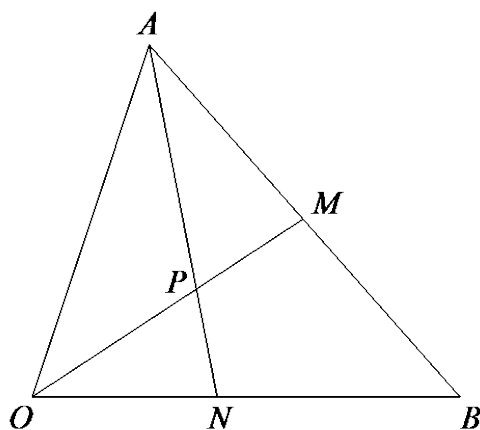
Find the value of y when $x = 45$

.....
(Total for Question 14 is 4 marks)

15 The ratio $(y + x) : (y - x)$ is equivalent to $k : 1$

Show that $y = \frac{x(k+1)}{k-1}$

(Total for Question 15 is 3 marks)



OAB is a triangle.

OPM and APN are straight lines.

M is the midpoint of AB .

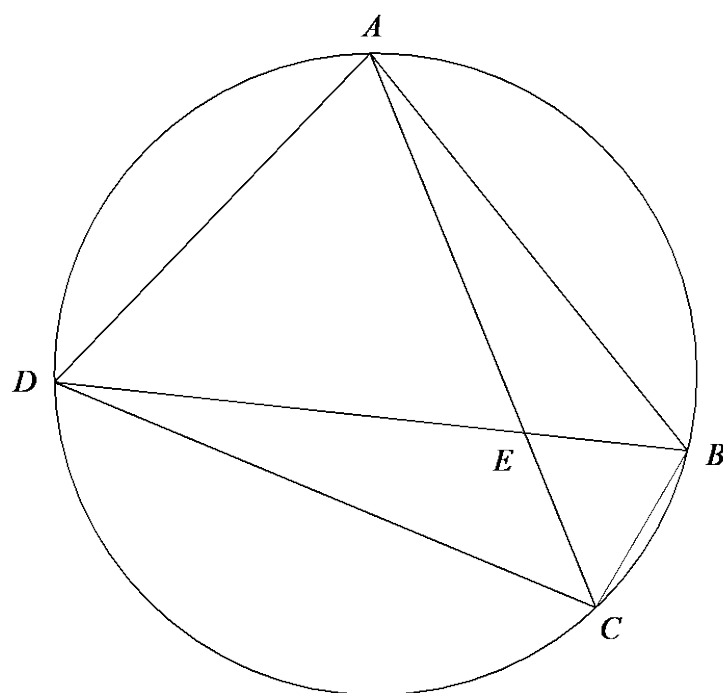
$$\vec{OA} = \mathbf{a} \quad \vec{OB} = \mathbf{b}$$

$$OP : PM = 3 : 2$$

Work out the ratio $ON : NB$

.....
(Total for Question 16 is 5 marks)

- 17 A, B, C and D are four points on a circle.



AEC and DEB are straight lines.

Triangle AED is an equilateral triangle.

Prove that triangle ABC is congruent to triangle DCB .

(Total for Question 17 is 4 marks)

18 There are only r red counters and g green counters in a bag.

A counter is taken at random from the bag.

The probability that the counter is green is $\frac{3}{7}$

The counter is put back in the bag.

2 more red counters and 3 more green counters are put in the bag.

A counter is taken at random from the bag.

The probability that the counter is green is $\frac{6}{13}$

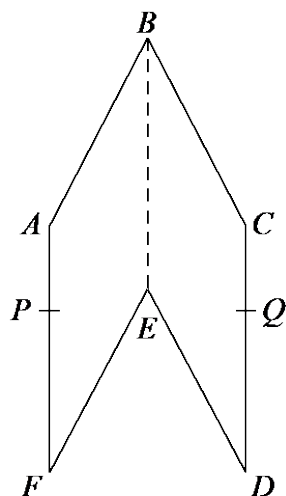
Find the number of red counters and the number of green counters that were in the bag originally.

red counters.....

green counters.....

(Total for Question 18 is 5 marks)

- 19 The diagram shows a hexagon $ABCDEF$.



$ABEF$ and $CBED$ are congruent parallelograms where $AB = BC = x$ cm.
 P is the point on AF and Q is the point on CD such that $BP = BQ = 10$ cm.
 Given that angle $ABC = 30^\circ$,

prove that $\cos PBQ = 1 - \frac{(2 - \sqrt{3})}{200} x^2$

(Total for Question 19 is 5 marks)

20 There are only green pens and blue pens in a box.

There are three more blue pens than green pens in the box.

There are more than 12 pens in the box.

Simon is going to take at random two pens from the box.

The probability that Simon will take two pens of the same colour is $\frac{27}{55}$

Work out the number of green pens in the box.

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(Total for Question 20 is 6 marks)

TOTAL FOR PAPER IS 80 MARKS