Please check the examination details below before entering your candidate information

Candidate surname	Other names

Pearson Edexcel Level 3 GCE

Centre Number | Candidate Number

Summer 2019

Time: 1 hour | Paper Reference 9MA0/PT1

Mathematics

Practice test

A level questions for GCSE Higher tier

You must have:
Calculator

Total Marks

Candidates may use any calculator allowed by Pearson regulations. Calculators must not have the facility for symbolic algebra manipulation, differentiation and integration, or have retrievable mathematical formulae stored in them.

Instructions
- Use **black** ink or ball-point pen.
- If pencil is used for diagrams / sketches / graphs it must be dark (HB or B).
- Answer **all** questions and ensure that your answers to parts of questions are clearly labelled.
- You should show sufficient working to make your methods clear. Answers without working may not gain full credit.
- Answers should be given to three significant figures unless otherwise stated.

Information
- There are 19 questions in this question paper. The total mark for this paper is 53.
- 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.
- Try to answer every question.
- Check your answers if you have time at the end.

Answer ALL questions.

1. (*a*) Find the value of $3x^3 + 2ax^2 - 4x + 5a$ when $x = -3$.

(2)

(*b*) Find the value of a when $69 + 23a = 0$.

(1)

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2. Three Bags, *A*, *B* and *C*, each contain 1 red marble and some green marbles.

Bag *A* contains 1 red marble and 9 green marbles only
Bag *B* contains 1 red marble and 4 green marbles only
Bag *C* contains 1 red marble and 2 green marbles only

Sasha selects at random one marble from Bag *A*.
If he selects a red marble, he stops selecting.
If the marble is green, he continues by selecting at random one marble from Bag *B*.
If he selects a red marble, he stops selecting.
If the marble is green, he continues by selecting at random one marble from Bag *C*.

(*a*) Draw a tree diagram to represent this information.

(2)

(*b*) Find the probability that Sasha selects 3 green marbles.

(2)

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3. (*a*) Rearrange the equation $1 - \frac{x^2}{2} - 2x - \frac{1}{2} = 0$ into the form $ax^2 + bx + c = 0$.

(1)

(*b*) Solve the equation found in part (*a*).

(1)

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4. Show that $\frac{(x+1)^2 \times (10x+10) - (5x^2+10x) \times 2(x+1)}{(x+1)^4} = \frac{A}{(x+1)^n}$ where A and n are integers to be found.

(2)

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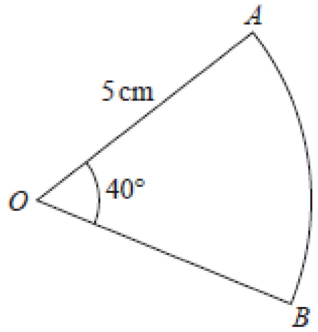
5. Find the area of the sector *AOB*.



(2)

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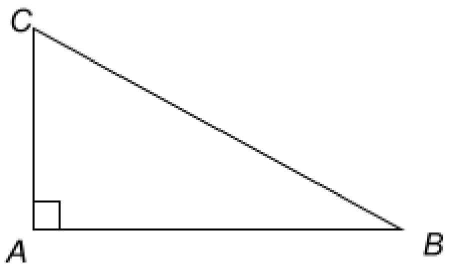
6. (*a*) Find x when $\frac{4-3x}{1+2x} = -\frac{4}{3}$

(2)

(*b*)



The diagram shows a right-angled triangle *ABC* where $AB = x^2 - x$ and $AC = \frac{3}{2}x^2 - 4x$.
Find the distance *BC* when $x = 4$.

(2)

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7. (*a*) Write $f(x) = 2x^2 + 4x + 9$ in the form $a(x + b)^2 + c$.

(3)

(*b*) Sketch the curve with equation $y = 2x^2 + 4x + 9$, showing any points of intersection with the coordinate axis and the coordinates of any turning point.

(3)

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8. Find x when $10(\cos x)^2 = 9$, $0° < x < 90°$.

(2)

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9. Magali is studying the mean total cloud cover, in oktas, using data from the large data set. The daily mean total cloud cover for all 184 days from the large data set is summarised in the table below.

Daily mean total cloud cover (oktas)	0	1	2	3	4	5	6	7	8
Frequency (number of days)	0	1	4	7	10	30	52	52	28

One of the 184 days is selected at random.

(*a*) Find the probability that it has a daily mean total cloud cover of 6 or greater.
(1)

There were 28 days that had a daily mean total cloud cover of 8. For these 28 days the daily mean total cloud cover for the **following** day is shown in the table below.

Daily mean total cloud cover (oktas)	0	1	2	3	4	5	6	7	8
Frequency (number of days)	0	0	1	1	2	1	5	9	9

(*b*) Find the proportion of these days when the daily mean total cloud cover was 6 or greater.
(1)

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10. (*a*) Solve the simultaneous equations

$$x + 880y = 1100$$

$$x + 300y = 680$$

(1)

(*b*) Find the least value of n when $2n - (428 + 0.84n) > 0$
(1)

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11. (*a*) Expand and simplify $y = x(x + 2)(x - 4)$.
(1)

(*b*) Find the value of $\frac{1}{4}x^4 - \frac{2}{3}x^3 - 4x^2$ when $x = 2$.
(1)

(*c*) Expand and simplify $y = (x + 2)^2(3x^2 - 20x + 20)$.
(2)

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12. Given that $a - b = \frac{a}{b}$, show that $a = \frac{b^2}{b-1}$.
(2)

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13. Work out how far a car moving at 60 km h^{-1} travels in 0.8 seconds, giving your answer in metres.

(1)

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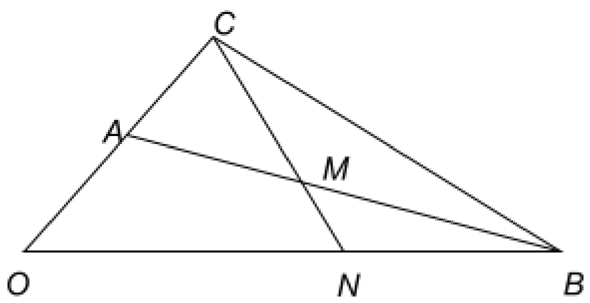
14. If n is an integer greater than 1, show, by considering both odd and even numbers, that $n^2 + 2$ is not divisible by 4.

(4)

15.



The diagram shows a sketch of triangle OAB.

The point C is such that $\overrightarrow{OC} = 2\overrightarrow{OA}$.

The point M is the midpoint of AB.

The straight line through C and M cuts OB at the point N.

Given $\overrightarrow{OA} = \mathbf{a}$ and $\overrightarrow{OB} = \mathbf{b}$, find $\overrightarrow{CM}$ in terms of **a** and **b**.

(2)

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16. Use the iteration formula

$$x_{n+1} = 2x_n^{1-x_n}$$

with $x_1 = 1.5$ to find x_4 to 3 decimal places.

(2)

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17. (*a*) A runner finishes a race in $24 + (6 \times 1.05) + (6 \times 1.05^2)$ minutes. Find this time in hours, minutes and seconds.

(1)

(*b*) A runner finishes a race in $24 + 6.3 \times \dfrac{(1.05^{16} - 1)}{1.05 - 1}$ minutes. Find this time in hours, minutes and seconds.

(2)

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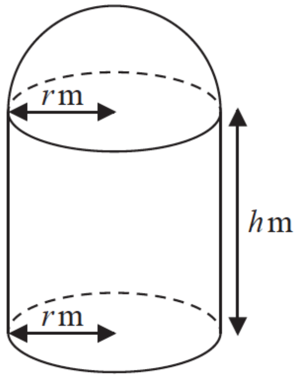
18. $y = \frac{p - 3x}{(2x - q)(x + 3)}$. Find the value of p when $y = \frac{1}{2}$, $x = 3$ and $q = 4$.

(2)

19.



[A sphere of radius r has volume EMBED Equation.DSMT4 πr^3 and surface area $4\pi r^2$]

A manufacturer produces a storage tank modelled in the shape of a hollow circular cylinder closed at one end with a hemispherical shell at the other end as shown in the diagram above.

The cylinder has radius r metres and height h metres and the hemisphere has radius r metres. The volume of the tank is 6 m^3.

Show that the surface area of the tank, in m^2, is given by

$$\frac{12}{r} + \frac{5}{3}\pi r^2$$

(4)

TOTAL FOR PRACTICE TEST: 53 MARKS