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MATHEMATICS**0580/22**

Paper 2 (Extended)

October/November 2021**1 hour 30 minutes**

You must answer on the question paper.

You will need: Geometrical instruments

INSTRUCTIONS

- Answer **all** questions.
- Use a black or dark blue pen. You may use an HB pencil for any diagrams or graphs.
- Write your name, centre number and candidate number in the boxes at the top of the page.
- Write your answer to each question in the space provided.
- Do **not** use an erasable pen or correction fluid.
- Do **not** write on any bar codes.
- You should use a calculator where appropriate.
- You may use tracing paper.
- You must show all necessary working clearly.
- Give non-exact numerical answers correct to 3 significant figures, or 1 decimal place for angles in degrees, unless a different level of accuracy is specified in the question.
- For π , use either your calculator value or 3.142.

INFORMATION

- The total mark for this paper is 70.
- The number of marks for each question or part question is shown in brackets [].

This document has **12** pages.

2

- 1 The temperature at midnight is -8.5°C .
The temperature at 11 am is -1°C .

Work out the difference between the temperature at midnight and the temperature at 11 am.

..... $^{\circ}\text{C}$ [1]

- 2 The stem-and-leaf diagram shows the age, in years, of each of 15 women.

3	1	5	8	9			
4	1	1	2	3	5	6	9
5	0	2	3	8			

Key: 3 | 1 represents 31 years

Complete these statements.

The modal age is

The median age is

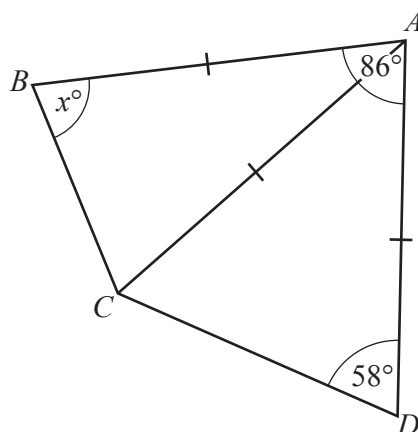
The percentage of women that are older than 51 years is%. [3]

- 3 Change 2.15 hours into minutes.

..... min [1]

3

4

NOT TO
SCALE

Triangle ABC and triangle ACD are isosceles.
Angle $DAB = 86^\circ$ and angle $ADC = 58^\circ$.

Find the value of x .

$x = \dots\dots\dots$ [3]

- 5 Angelique rents a room for a party.
The cost of renting the room is \$15.50 for the first hour and then \$7.25 for each additional hour.
She pays \$95.25 in total.

Work out the total number of hours she rents the room for.

$\dots\dots\dots$ hours [3]

4

- 6 Without using a calculator, work out $\frac{1}{3} \div \frac{7}{6} + \frac{1}{5}$.

You must show all your working and give your answer as a fraction in its simplest form.

..... [4]

- 7 Katy has 5 white flowers, x red flowers and $(2x + 1)$ yellow flowers.
She picks a flower at random.

The probability that it is white is $\frac{1}{12}$.

Find the probability that it is yellow.

..... [4]

- 8 Calculate $\sqrt[4]{39\frac{1}{16}}$.

..... [1]

5

9 2.1×10^{-1} 0.2 22% $\sqrt{0.2}$ $\frac{24}{1000}$

Write these values in order of size, starting with the smallest.

..... < < < < [2]
smallest

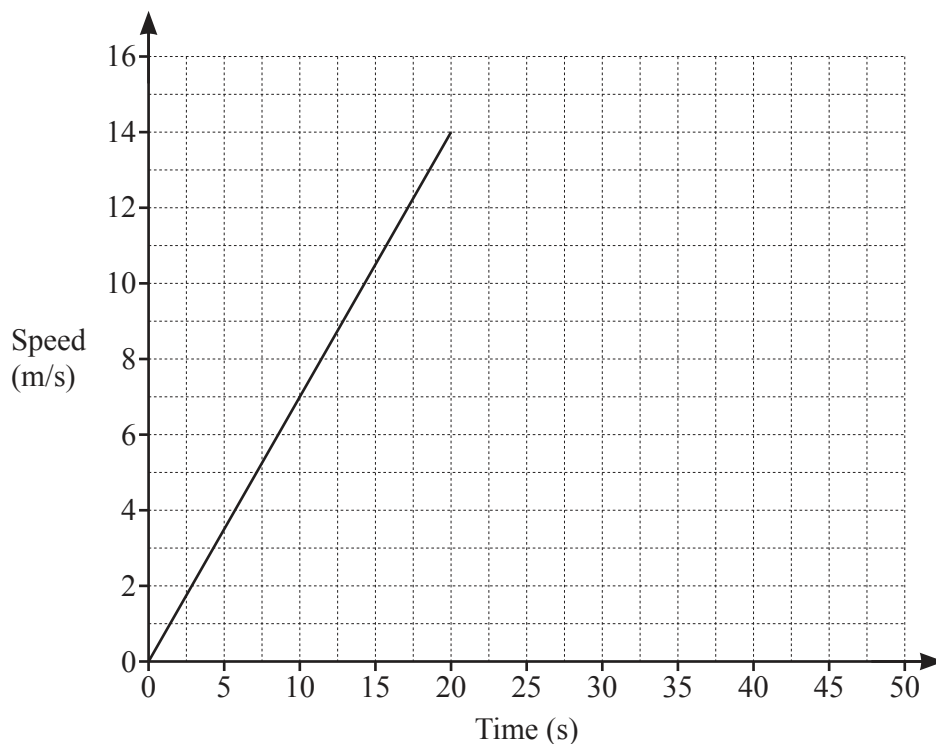
- 10 The interior angle of a regular polygon is 156° .

Work out the number of sides of this polygon.

..... [2]

- 11 A car starts its journey by accelerating from rest at a constant rate of 0.7 m/s^2 for 20 seconds, before reaching a constant speed of 14 m/s .
 It then travels at 14 m/s for a distance of 210 m .
 The car then decelerates at a constant rate of 1.4 m/s^2 , before coming to a stop.

On the grid, complete the speed–time graph for the car’s journey.



[3]

12 The table shows the first five terms of sequences A , B and C .

	1st term	2nd term	3rd term	4th term	5th term	n th term
Sequence A	8	3	-2	-7	-12	
Sequence B	2	$\frac{3}{2}$	$\frac{4}{3}$	$\frac{5}{4}$	$\frac{6}{5}$	
Sequence C	$\frac{1}{2}$	1	2	4	8	

Complete the table to show the n th term of each sequence.

[5]

13 (a) Write 243×27^{2n} as a single power of 3 in terms of n .

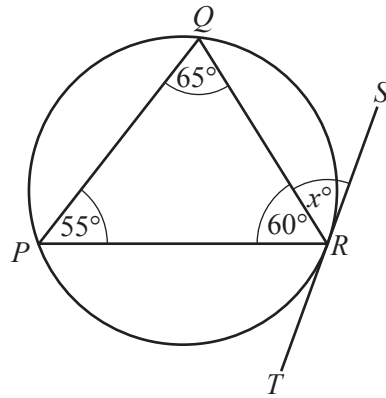
..... [2]

(b) $k = 2 \times 3^2 \times p^3$, where p is a prime number greater than 3.

Write $6k^2$ as a product of prime factors in terms of p .

..... [2]

14

NOT TO
SCALE

P , Q and R are points on a circle.
 ST is a tangent to the circle at R .

- (a) Write down the value of x .
 Give a geometrical reason for your answer.

$x = \dots\dots\dots$ because $\dots\dots\dots$
 $\dots\dots\dots$ [2]

- (b) Another tangent from the point S touches the circle at V .

Give a geometrical reason why triangle SVR is isosceles.

$\dots\dots\dots$
 $\dots\dots\dots$ [1]

- 15 (a) A is the point $(3, 16)$ and B is the point $(8, 31)$.

Find the equation of the line that passes through A and B .
 Give your answer in the form $y = mx + c$.

$y = \dots\dots\dots$ [3]

- (b) The line CD has equation $y = 0.5x - 11$.

Find the gradient of a line that is perpendicular to the line CD .

$\dots\dots\dots$ [1]

16 Sachin picks a number at random from the first three multiples of 3.
He then picks a number at random from the first three prime numbers.
He adds the two numbers to find a score.

(a) Complete the table.

		Multiples of 3		
		3		9
Prime numbers	2	5		11
	3	6		

[2]

(b) Given that the score is even, find the probability that one of the numbers he picks is 9.

..... [2]

17 Solve.
 $(5x - 3)(2x + 7) = 0$

$x =$ or $x =$ [1]

9

- 18** Solve the simultaneous equations.
You must show all your working.

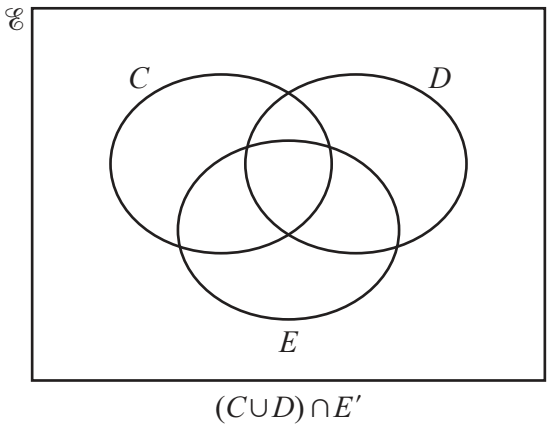
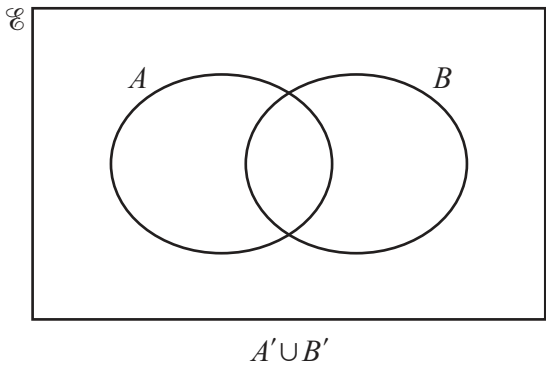
$$y = x^2 - 9x + 21$$

$$y = 2x - 3$$

$$x = \dots\dots\dots y = \dots\dots\dots$$

$$x = \dots\dots\dots y = \dots\dots\dots [5]$$

19 In these Venn diagrams, shade the given regions.



[2]

20 $f(x) = 2^{x-3}$ $g(x) = 2x - 1$ $h(x) = \frac{5}{x-4}$

(a) Find $ff(6)$.

..... [2]

(b) Find $g^{-1}g(x+21)$.

..... [1]

(c) Find x when $f(x) = h(84)$.

$x =$ [2]

11**21** Expand and simplify.

$$(x-3)^2(2x+5)$$

..... [3]

22 Solve the equation $7 \sin x + 2 = 0$ for $0^\circ \leq x \leq 360^\circ$.

..... [3]

Question 23 is printed on the next page.

23 Simplify.

$$\frac{3xy + 36y - 5x - 60}{2x^2 - 288}$$

..... [4]

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