JUNYUAN SECONDARY SCHOOL
PRELIMINARY EXAMINATION 2021
SECONDARY FOUR EXPRESS / FIVE NORMAL (ACADEMIC)

CANDIDATE NAME

CLASS | | | | INDEX NUMBER | |

MATHEMATICS

4048/01

Paper 1

20 Aug 2021

2 hours

Candidates answer on the Question Paper.

READ THESE INSTRUCTIONS FIRST

Write your name, class and index number on all the work you hand in.
Write in dark blue or black pen.
You may use an HB pencil for any diagrams or graphs.
Do not use paper clips, highlighters, glue or correction fluid.

Answer **all** questions.
If working is needed for any question it must be shown with the answer.
Omission of essential working will result in loss of marks.
The use of an approved scientific calculator is expected, where appropriate.
If the degree of accuracy is not specified in the question, and if the answer is not exact, give the answer to three significant figures. Give answers in degrees to one decimal place.
For π, use either your calculator value or 3.142, unless the question requires the answer in terms of π.

At the end of the examination, fasten all your work securely together.
The number of marks is given in brackets [ ] at the end of each question or part question.
The total of the marks for this paper is 80.

For Examiner's Use
80

This document consists of **23** printed pages and **1** blank page.

[Turn over

www.testpapersfree.com
Downloaded from SingaKids.com

www.testpapersfree.com

Downloaded from SingaKids.com

Mathematical Formulae

Compound interest

$$\text{Total amount} = P\left(1+\frac{r}{100}\right)^n$$

Mensuration

$$\text{Curved surface area of a cone} = \pi rl$$

$$\text{Surface area of a sphere} = 4\pi r^2$$

$$\text{Volume of a cone} = \frac{1}{3}\pi r^2 h$$

$$\text{Volume of a sphere} = \frac{4}{3}\pi r^3$$

$$\text{Area of triangle } ABC = \frac{1}{2}ab\sin C$$

$$\text{Arc length} = r\theta, \text{ where } \theta \text{ is in radians}$$

$$\text{Sector area} = \frac{1}{2}r^2\theta, \text{ where } \theta \text{ is in radians}$$

Trigonometry

$$\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$$

$$a^2 = b^2 + c^2 - 2bc\cos A$$

Statistics

$$\text{Mean} = \frac{\sum fx}{\sum f}$$

$$\text{Standard deviation} = \sqrt{\frac{\sum fx^2}{\sum f} - \left(\frac{\sum fx}{\sum f}\right)^2}$$

PartnerInLearning
www.testpapersfree.com

Downloaded from SingaKids.com

1 By rounding each number to 1 significant figure, estimate the value of $\frac{1\,988\times 6.32}{342.5-142.5}$.

Show your working clearly.

Answer ..... [2]

---

2 Triangle ABC is a right-angled triangle.

Given that two of its lengths are 11 cm and 5 cm, find two possible lengths for the third side of the triangle.

Answer ..... cm or ..... cm [2]

PartnerInLearning
372
www.testpapersfree.com

Downloaded from SingaKids.com

3 The frequency table below shows the number of books read by a group of students in a month.

Number of books	1	2	3	4	5	6
Number of students	9	4	x	8	6	5

(a) Write down the least possible value of x if the mode is 3.

Answer $x =$ ..... [1]

(b) Find the largest value of x if the median is 4.

Answer $x =$ ..... [1]

---

4 **(a)** Express 3 780 as the product of its prime factors in index notation.

Answer 3 780 = ... [1]

(b) The lowest common multiple of 3 780 and integer k is 7 560.
The highest common factor of 3 780 and integer k is 60.

Find the smallest possible integer value of k.

Answer $k =$ ..... [2]

PartnerInLearning
www.testpapersfree.com

Downloaded from SingaKids.com

5 Make x the subject of the given formula $\frac{3}{y} = \sqrt{\frac{y}{2x^2 - 1}}$.

Answer $x =$ ..... [3]

PartnerInLearning
374
www.testpapersfree.com

Downloaded from SingaKids.com

6 Solve the pair of given equations simultaneously.

$$2x - 3y = 13,$$
$$3x - 12y = 42.$$

Answer $x =$ .....

$y =$ ..... [3]

PartnerInLearning
www.testpapersfree.com

Downloaded from SingaKids.com

7 The speed of gamma rays in air is approximately 2.983×10^{10} cm/s.

(a) Express this speed in metres per second. Give your answer in standard form.

Answer ..... m/s [1]

(b) Calculate the time taken, in microseconds, for gamma rays to travel 10 000 metres.
[micro = 10^{-6}]

Answer ..... μs [2]

---

8 An apartment is selling at \$750 000.
There is a scheme where the buyer is required to pay a downpayment of 15%, the remaining of which is a loan at a simple interest rate of 4.2% per annum to be repaid in monthly instalments over 20 years.

Calculate the amount of each monthly instalment.

Answer \$ ..... [3]

PartnerInLearning
376
www.testpapersfree.com

Downloaded from SingaKids.com

9 For a regular polygon with n sides, the ratio of the size of an interior angle to its exterior angle is 7 : 2.

(a) Find the size of the interior angle.

Answer .....° [1]

(b) Find the value of n.

Answer n = ... [2]

PartnerInLearning
www.testpapersfree.com
Downloaded from SingaKids.com

10 A forest reserve of area 225 km^2 is represented by an area of 36 cm^2 on a map.

(a) Given that the scale of the map is 1 : n, find the value of n.

Answer n = ... [2]

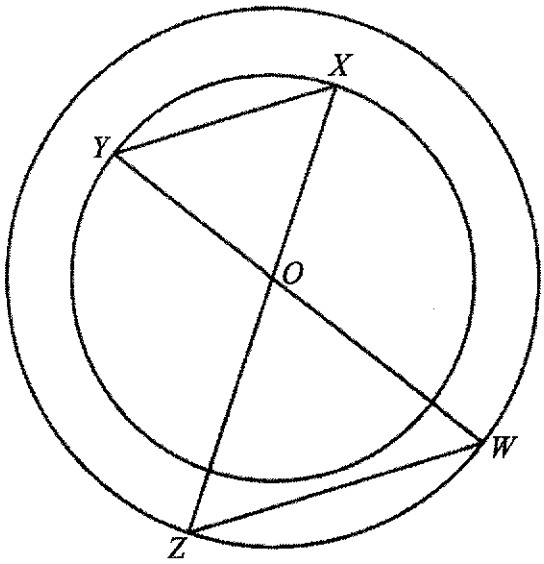
(b) Find the actual distance, in kilometres, of a trail represented by 2.1 cm on the map.

Answer ..... km [1]

PartnerInLearning
378
www.testpapersfree.com

Downloaded from SingaKids.com

11 In the diagram, O is the centre of two concentric circles.
X and Y lie on the circumference of the smaller circle, while W and Z lie on the circumference of the larger circle.
WY and XZ intersect at O.



With clear reasoning, prove that triangle WOX and triangle ZOY are congruent.

Answer .....

.....

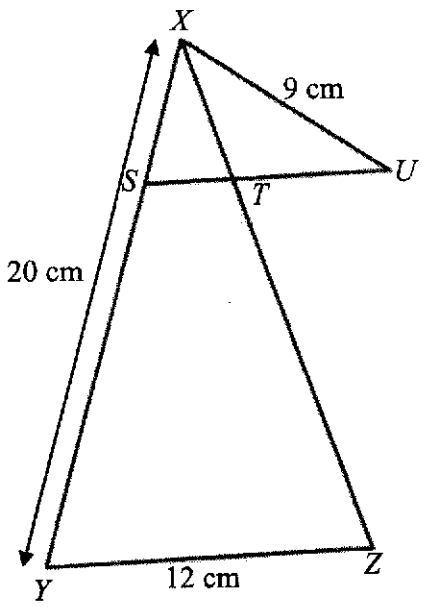
.....

..... [3]

PartnerInLearning
www.testpapersfree.com

Downloaded from SingaKids.com

12 In the diagram, triangle XYZ is similar to triangle UXS.



Given that $US = UX = 9$ cm, $XY = XZ = 20$ cm and $YZ = 12$ cm, find the length of SY.

Answer ..... cm [3]

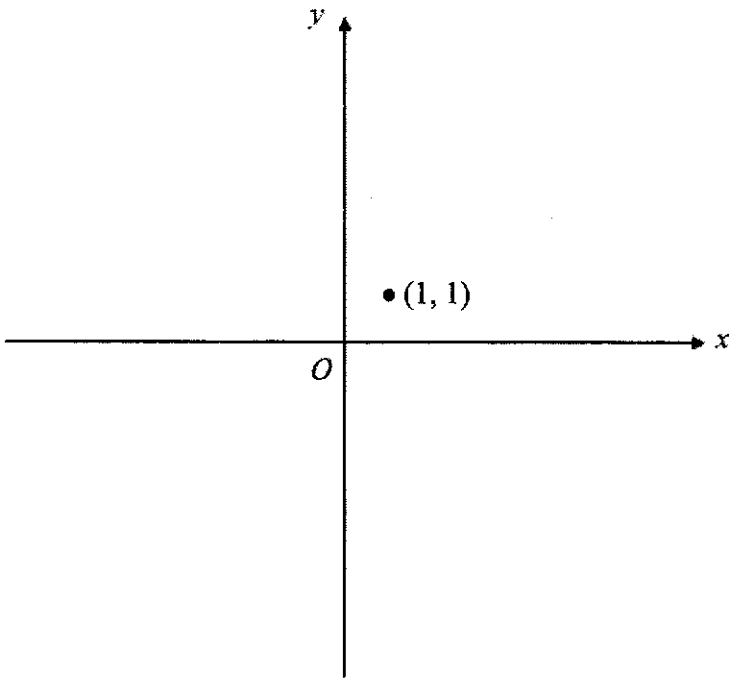
PartnerInLearning
380
www.testpapersfree.com

Downloaded from SingaKids.com

13 **(a)** Sketch the graph of $y = \frac{2}{x^2}$ on the axes below.

The point (1, 1) is shown in the diagram.

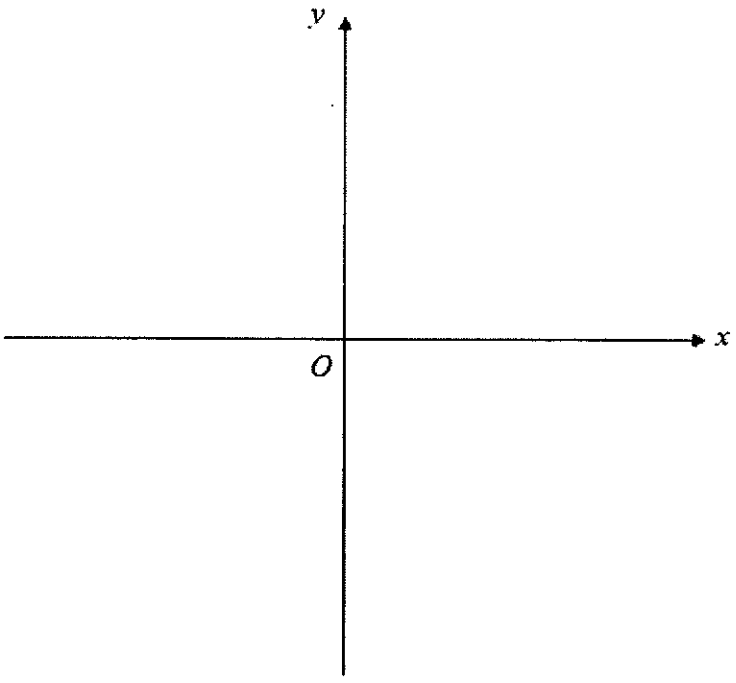
Answer [2]



(b) Sketch the graph of $y = 5^x$ on the axes below.

Indicate clearly where the graph intersects with the axes on your sketch.

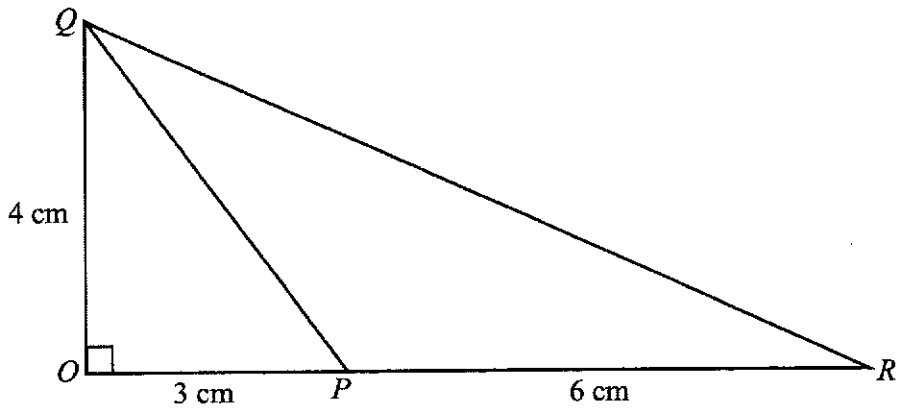
Answer [1]



PartnerInLearning
www.testpapersfree.com

Downloaded from SingaKids.com

14 The diagram shows a right-angled triangle OQR, where $OQ = 4$ cm and P is a point on OR such that $OP = 3$ cm and $PR = 6$ cm.



Express as a fraction in its simplest form,

(a) $\cos \angle QPR$,

Answer ..... [1]

(b) $\tan \angle PRQ$,

Answer ..... [1]

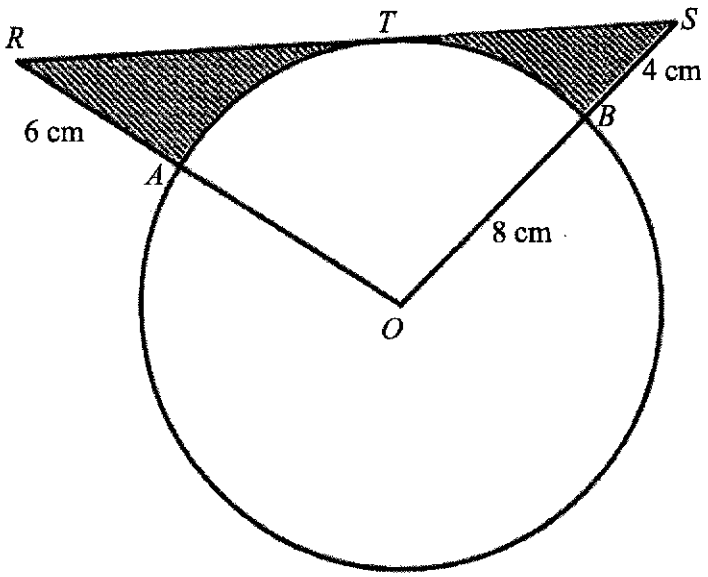
(c) $\dfrac{\sin \angle PQR}{\sin \angle PRQ}$.

Answer ..... [2]

PartnerInLearning
382
www.testpapersfree.com

Downloaded from SingaKids.com

15 The diagram shows a circle of radius 8 cm and centre O.
The tangent to the circle at T meets OA produced at R and OB produced at S.
The area of minor sector OAB is 57.5 cm^2, $AR = 6$ cm and $BS = 4$ cm.



(a) Show that angle AOB is 1.797 radians.

Answer .....

.....

.....

..... [2]

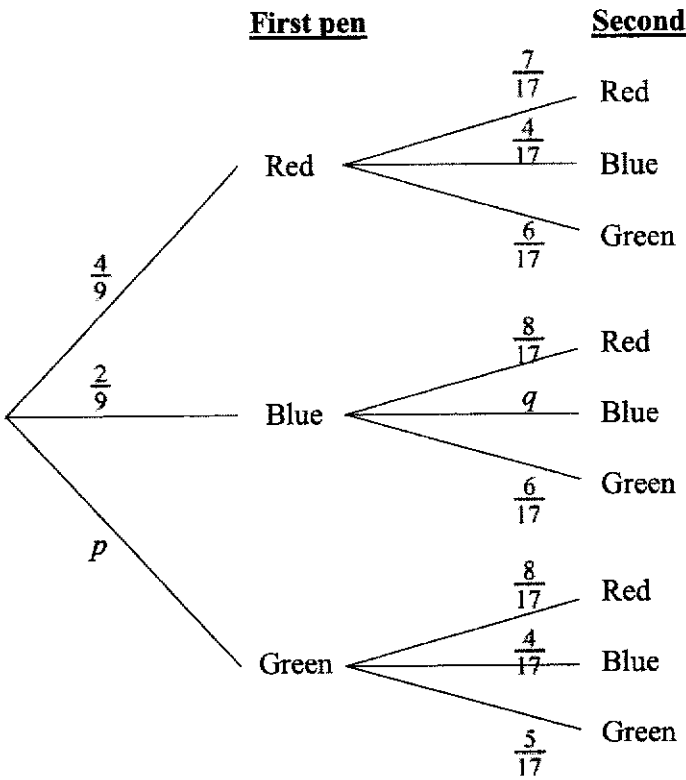
(b) Calculate the shaded area.

Answer ..... cm^2 [2]

PartnerInLearning
www.testpapersfree.com

Downloaded from SingaKids.com

16 Jane had a box filled with 8 red pens, 4 blue pens and 6 green pens.
She took out two pens at random, one after the other, without replacement.



(a) Write down the value of p and of q as a fraction in its simplest form.

Answer p = ...

q = ... [1]

(b) Calculate the probability that

(i) one pen is blue and the other is green,

Answer ..... [1]

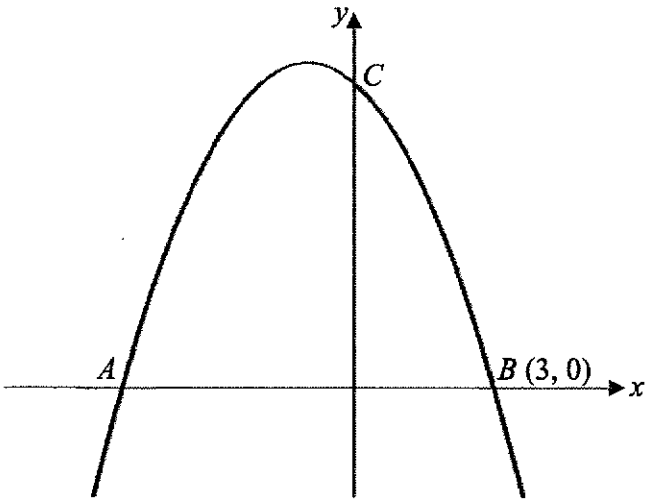
(ii) both pens are of different colours.

Answer ..... [2]

PartnerInLearning
384
www.testpapersfree.com

Downloaded from SingaKids.com

17 The diagram below shows the sketch of the graph $y = -x^2 + px + q$.
The graph cuts the x-axis at points A and $B(3, 0)$.
The graph also cuts the y-axis at point C.
The equation of the line of symmetry of the graph is $x = -1$.



(a) Write down the coordinates of the point A.

Answer A(..... , ...) [1]

(b) Find the value of p and of q.

Answer p = ...

q = ... [3]

(c) Write down the coordinates of the point C.

Answer C(..... , ...) [1]

PartnerInLearning
www.testpapersfree.com

Downloaded from SingaKids.com

18 Study the pattern below.

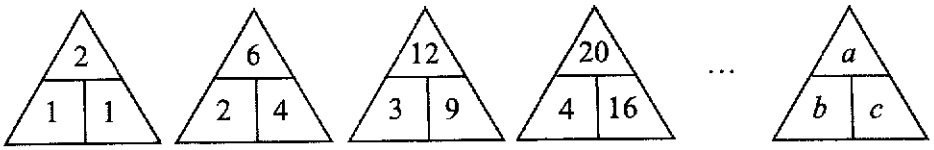


Figure 1 Figure 2 Figure 3 Figure 4 Figure *n*

(a) Write down the values of a, b and c in Figure 11.

Answer a = ...

b = ...

c = ... [2]

(b) Write down an expression, in terms of n, for a in Figure n.

Answer a = ... [1]

(c) Explain why the value of a is even for all integer values of n.

Answer .....

.....

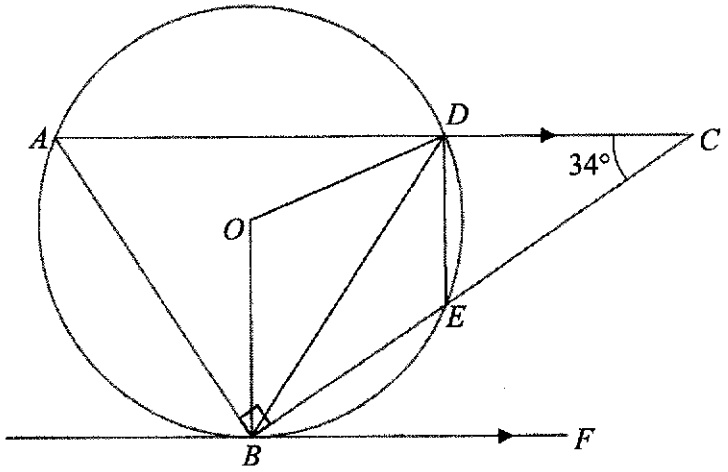
.....

..... [2]

PartnerInLearning
386
www.testpapersfree.com

Downloaded from SingaKids.com

19



The points A, B, E and D lie on the circle with centre O.
BEC is a straight line and BF is a tangent to the circle at point B.
It is given that AC is parallel to BF, angle $ABC = 90°$ and angle $ACB = 34°$.

Stating reasons clearly, calculate

(a) angle OBE,

Answer .....° [2]

(b) angle DEB,

Answer .....° [2]

(c) angle BOD.

Answer .....° [1]

PartnerInLearning
www.testpapersfree.com

Downloaded from SingaKids.com

20 The diagram shows the map of a garden in the shape of a quadrilateral $ABCD$.
The scale of the map is 1 cm to 10 m.

(a) Using a pair of compasses and ruler, construct

(i) the perpendicular bisector of AB, and [1]

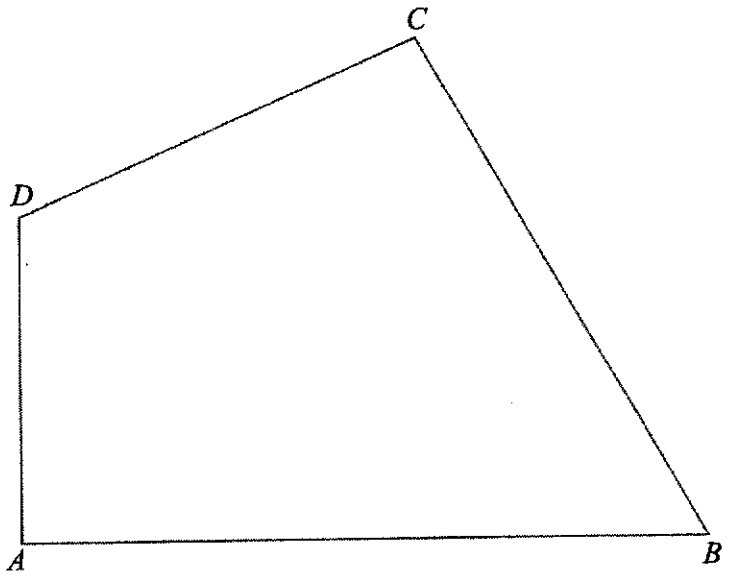
(ii) the angle bisector of angle ABC. [1]

(b) A statue S is located inside the garden $ABCD$ such that it is 55 m from D and equidistant from A and B.

Label the exact position of S. [2]

(c) A pine tree T is located inside the garden $ABCD$ such that it is equidistant from AB and BC, and equidistant from A and B.

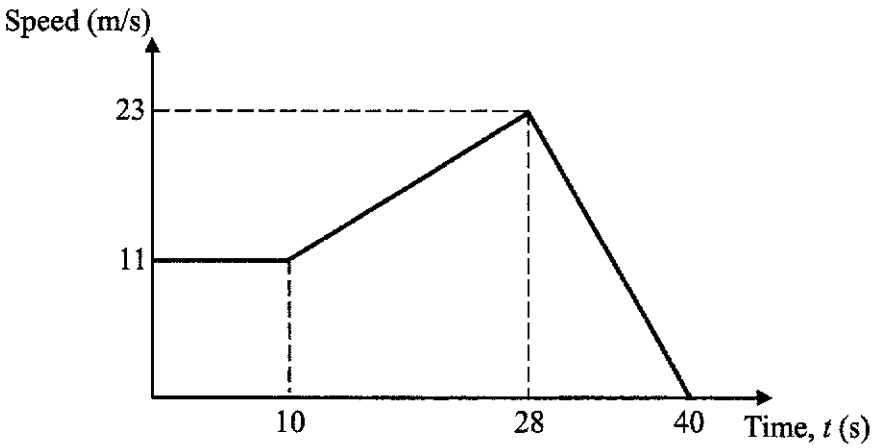
Label the exact position of T. [1]



PartnerInLearning
388
www.testpapersfree.com

Downloaded from SingaKids.com

21 The diagram shows the speed-time graph of an object over a period of 40 seconds.



(a) Calculate the deceleration of the object at $t = 35$.

Answer ..... m/s^2 [1]

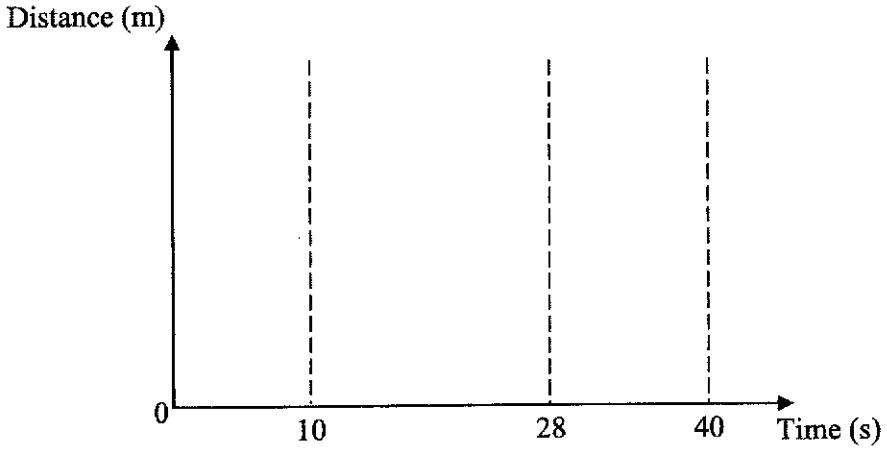
(b) Find the speed of the object at $t = 18$.

Answer ..... m/s [2]

PartnerInLearning
www.testpapersfree.com
Downloaded from SingaKids.com

(c) On the axes in the answer space below, sketch the distance-time graph of the object and indicate clearly, on the vertical axis, the distance travelled at $t = 10$, $t = 28$ and $t = 40$.

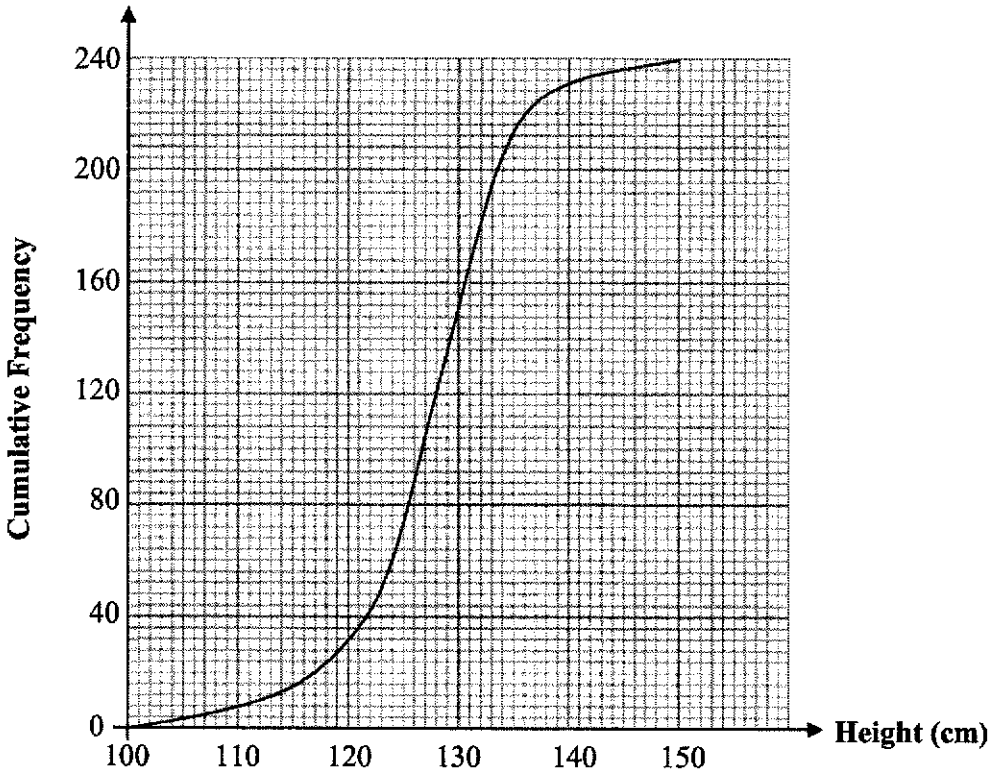
Answer [3]



PartnerInLearning
390
www.testpapersfree.com

Downloaded from SingaKids.com

22 The cumulative frequency graph shows the distribution of heights of a sample of 240 children from ABC Primary School.



(a) Find the interquartile range.

Answer ..... cm [2]

(b) It is given that 15% of the students are taller than h cm.

Find the value of h.

Answer $h =$ ..... [2]

PartnerInLearning
www.testpapersfree.com

Downloaded from SingaKids.com

(c) The height of 240 children from XYZ Primary School have a larger median and a smaller standard deviation.

Describe how their cumulative frequency curve will differ from ABC Primary School.

Answer .....

.....

.....

..... [2]

End of Paper

PartnerInLearning
392
www.testpapersfree.com

Downloaded from SingaKids.com

JUNYUAN SECONDARY SCHOOL
PRELIMINARY EXAMINATION 2021
SECONDARY FOUR EXPRESS / FIVE NORMAL (ACADEMIC)

CANDIDATE NAME

CLASS | | | | INDEX NUMBER | | |

MATHEMATICS

4048/02

Paper 2

24 August 2021

2 hours and 30 minutes

Candidates answer on the Question Paper.

READ THESE INSTRUCTIONS FIRST

Write your name, class and index number on all your work you hand in.
Write in dark blue or black pen.
You may use an HB pencil for any diagrams or graphs.
Do not use paper clips, highlighters, glue or correction fluid.

Answer **all** the questions.
If working is needed for any question it must be shown with the answer.
Omission of essential working will result in loss of marks.
The use of an approved scientific calculator is expected, where appropriate.
If the degree of accuracy is not specified in the question, and if the answer is not exact, give the answer to three significant figures. Give answers in degrees to one decimal place.
For π, use either your calculator value or 3.142, unless the question requires the answer in terms of π.

At the end of the examination, fasten all your work securely together.
The number of marks is given in brackets [ ] at the end of each question or part question.
The total number of marks for this paper is 100.

For Examiner's use
100

This document consists of **21** printed pages and **3** blank pages.

[Turn over

Downloaded from SingaKids.com

www.testpapersfree.com

Downloaded from SingaKids.com

Mathematical Formulae

Compound interest

$$\text{Total amount} = P\left(1+\frac{r}{100}\right)^n$$

Mensuration

Curved surface area of a cone $= \pi rl$

Surface area of a sphere $= 4\pi r^2$

Volume of a cone $= \frac{1}{3}\pi r^2 h$

Volume of a sphere $= \frac{4}{3}\pi r^3$

Area of triangle $ABC = \frac{1}{2}ab\sin C$

Arc length $= r\theta$, where θ is in radians

Sector area $= \frac{1}{2}r^2\theta$, where θ is in radians

Trigonometry

$$\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$$

$$a^2 = b^2 + c^2 - 2bc\cos A$$

Statistics

$$\text{Mean} = \frac{\sum fx}{\sum f}$$

$$\text{Standard deviation} = \sqrt{\frac{\sum fx^2}{\sum f} - \left(\frac{\sum fx}{\sum f}\right)^2}$$

PartnerInLearning
www.testpapersfree.com

Downloaded from SingaKids.com

1 **(a)** Solve the inequality $-\frac{3x+4}{2} < \frac{5-x}{7}$.

Answer ..... [2]

(b) Simplify $\left(\frac{64a^6}{b^{-15}}\right)^{-\frac{1}{3}}$, expressing your answer in positive index notation.

Answer ..... [2]

PartnerInLearning
396
www.testpapersfree.com

Downloaded from SingaKids.com

(c) Express $\frac{2}{2x-3} + \frac{7}{2x^2+x-6}$ as a single fraction in its simplest form.

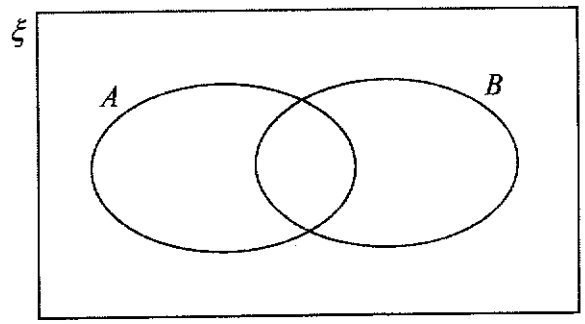
Answer ..... [3]

(d) Simplify $\frac{4u^2-v^2}{6uv-3v^2}$.

Answer ..... [2]

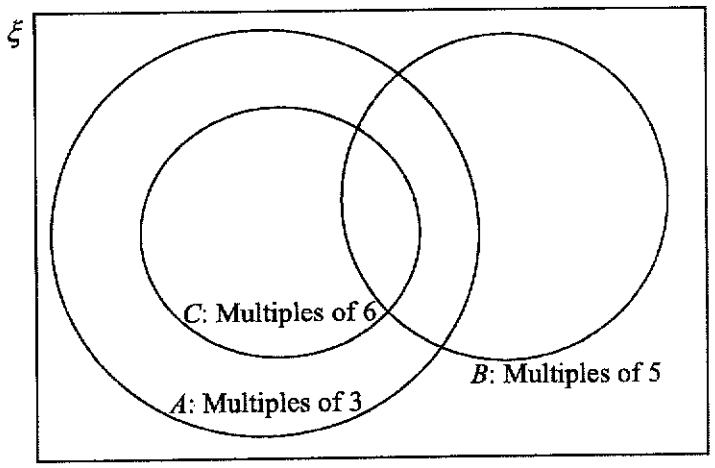
PartnerInLearning
www.testpapersfree.com
397
Downloaded from SingaKids.com

2 **(a)** In the Venn diagram below, shade the region $A' \cap B$. [1]



(b) **(i)** Place the five numbers in their correct positions in the Venn diagram below.

35, 45, 51, 60 and 76 [2]



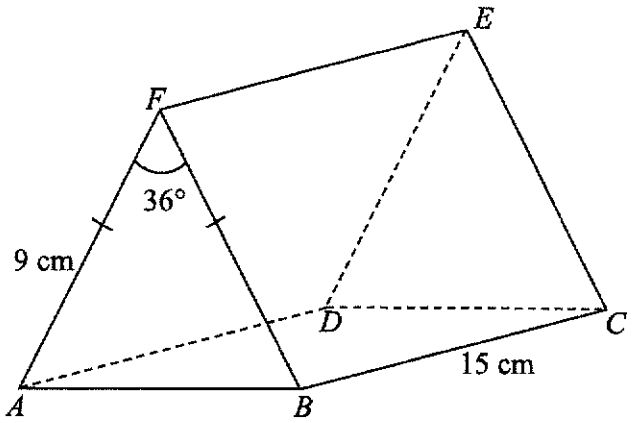
(ii) Use $\varnothing$, $\in$, $\notin$, $\subset$ or $\not\subset$ to complete the statement: 51 ____ B.

Answer ..... [1]

PartnerInLearning
398
www.testpapersfree.com

Downloaded from SingaKids.com

3 The diagram shows a solid prism *ABCDEF* whose cross section is an isosceles triangle. It is given that $AF = 9$ cm, $BC = 15$ cm and angle $AFB = 36°$.



(a) Calculate the volume of the prism *ABCDEF*.

Answer ..... cm^3 [3]

(b) The prism is then melted and moulded into smaller spheres of radius 0.8 cm. Johnny claims that there will be 166 spheres formed.

State, showing your calculations clearly, if Johnny's claim is correct.

Answer .....

..... [3]

PartnerInLearning
www.testpapersfree.com

Downloaded from SingaKids.com

4 Estate E and Estate W are 35 km apart.
Jason cycles at an average speed of x km/h from Estate E to Estate W.
On his return journey, he cycles 4 km/h faster.

(a) Write an expression, in terms of x, for the number of hours

(i) Jason takes to cycle from Estate E to Estate W,

Answer ..... h [1]

(ii) Jason takes to cycle from Estate W to Estate E.

Answer ..... h [1]

(b) Given that Jason completes the return journey 20 minutes faster, form an equation in x, and show that it reduces to $x^2 + 4x - 420 = 0$. [3]

(c) Solve the equation $x^2 + 4x - 420 = 0$.

Answer $x =$ ..... or ..... [3]

(d) Write down the time taken, in hours, for Jason to cycle from Estate E to Estate W.

Answer ..... h [1]

PartnerInLearning
400
www.testpapersfree.com

Downloaded from SingaKids.com

5 **(a)** Given that $\begin{pmatrix} 9 & 2 \\ 3 & 0 \end{pmatrix}\begin{pmatrix} 1 \\ -2y \end{pmatrix} = \begin{pmatrix} x \\ 2x-7 \end{pmatrix}$, find the value of x and of y.

Answer $x =$ .....

$y =$ ..... [2]

(b) Robert loves to eat Beef-burgers and Chicken-burgers.
The matrix, **T**, shows the total number of Beef-burgers and Chicken-burgers he consumed in a particular week.

$$\mathbf{T} = \begin{matrix} \\ \text{Monday to Friday} \\ \text{Saturday and Sunday} \end{matrix} \begin{matrix} \begin{matrix} \text{Beef} & \text{Chicken} \end{matrix} \\ \begin{pmatrix} 5 & 3 \\ 1 & 2 \end{pmatrix} \end{matrix}$$

(i) A Beef-burger has 300 calories and a Chicken-burger has 270 calories.

Represent these calories in a 2×1 column matrix **C**.

Answer $\mathbf{C} =$ ( ) [1]

(ii) **(a)** Evaluate the matrix $\mathbf{N} = \mathbf{TC}$.

Answer $\mathbf{N} =$ ( ) [2]

(b) State what the elements in **N** represent.

Answer .....

..... [1]

PartnerInLearning
www.testpapersfree.com

Downloaded from SingaKids.com

(iii) **(a)** Evaluate the matrix $\mathbf{A} = \frac{1}{7}(1 \quad 1)\mathbf{N}$.

Answer $\mathbf{A} =$ $\begin{pmatrix} & \\ & \end{pmatrix}$ [1]

(b) Explain what the matrix **A** represents.

Answer .....

..... [1]

(iv) Robert hopes to reduce his total calories intake by 50% on weekdays and maintain his total calories intake on weekend.

Using matrix multiplication, calculate the total amount of calories he should consume in the following week.

Answer ..... [2]

PartnerInLearning
402
www.testpapersfree.com

Downloaded from SingaKids.com

6 The variables x and y are connected by the equation $y = x^3 - 3x + 1$.
Some corresponding values of x and y are given in the table below.

x	−3	−2	−1	0	1	2	3
y	−17	k	3	1	−1	3	19

(a) Find the value of k.

Answer $k =$ ..... [1]

(b) In the grid on page 11, draw the graph of $y = x^3 - 3x + 1$ for $-3 \leq x \leq 3$. [2]

(c) Use your graph to solve $x^3 - 3x + 1 = 0$.

Answer $x =$ ..... or ..... or ..... [2]

(d) By drawing a tangent, find the gradient of the curve at $x = -1.5$.

Answer ..... [2]

(e) **(i)** In the same grid, draw the graph of $y = 3x - 1$. [1]

(ii) The line $y = 3x - 1$ and the curve $y = x^3 - 3x + 1$ can be used to solve the equation $x^3 = ax + b$.

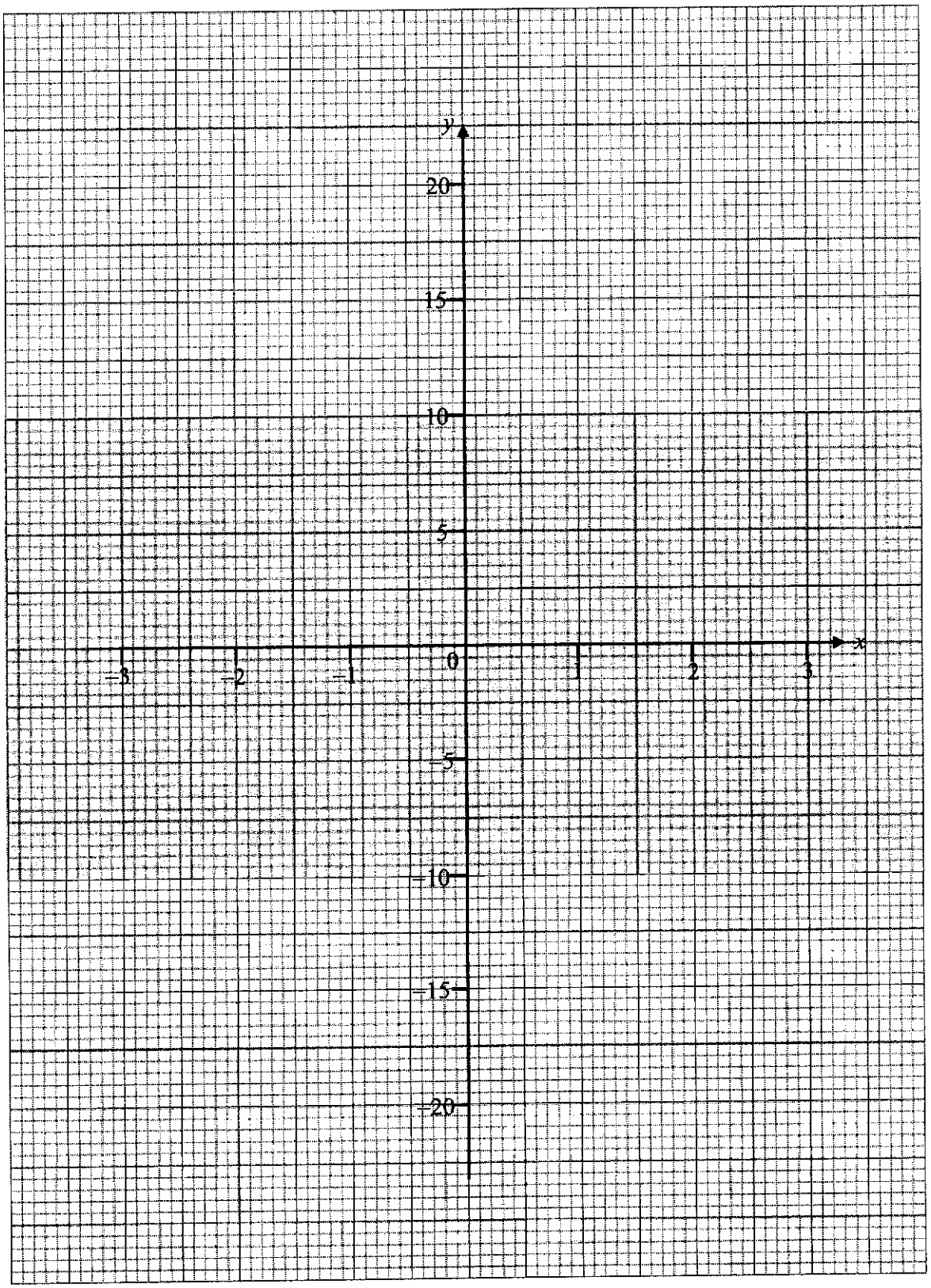
Find the value of a and of b.

Answer $a =$ .....

$b =$ ..... [2]

PartnerInLearning
www.testpapersfree.com

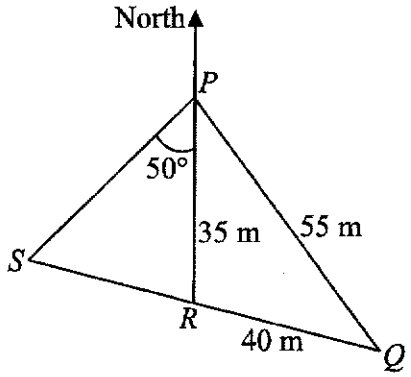
Downloaded from SingaKids.com



PartnerInLearning
404
www.testpapersfree.com

Downloaded from SingaKids.com

7 P, Q, R and S are points on a triangular garden.
SRQ is a straight line.
It is given that $PQ = 55$ m, $RQ = 40$ m, $PR = 35$ m and angle $SPR = 50°$.



(a) Find

(i) the bearing of S from P,

Answer .....° [1]

(ii) angle PRQ,

Answer .....° [3]

(iii) the area of triangle PQR.

Answer ..... m^2 [2]

PartnerInLearning
www.testpapersfree.com

Downloaded from SingaKids.com

(b) A gardener wants to make a shortest pathway from R to PQ.

Calculate the length of the pathway.

Answer ..... m [2]

(c) A tree of height 4 m was planted at R.

Find the greatest angle of elevation of the top of the tree when viewed from a point along PQ.

Answer .....° [2]

PartnerInLearning
406
www.testpapersfree.com

Downloaded from SingaKids.com

8 **(a)** The stem and leaf diagram below shows the marks obtained by 30 students in a Science test marked out of 80 marks.

1	8
2	
3	
4	2 2 3 4 5 6 7 8
5	0 1 1 2 4 8 9
6	3 3 3 3 3 6 7 7
7	0 3 5 5 6 6

Key: 2 | 3 means 23 marks

(i) Find the median mark.

Answer ..... [1]

(ii) Explain why the mean may not be an appropriate average to be used to summarise the marks obtained by these students.

Answer .....

..... [1]

(iii) A distinction is awarded to the top 30% of the students.

Find the minimum mark a student needs to score in order to achieve distinction.

Answer ..... [1]

(iv) Find the standard deviation of the marks.

Answer ..... [1]

(v) The standard deviation of the marks obtained by a second group of students who took the same test was 9.85.

Use this information to comment on the marks obtained by the two groups of students.

Answer .....

..... [1]

PartnerInLearning
www.testpapersfree.com

Downloaded from SingaKids.com

(b) At the cashier counter of a shop, a customer may pay for his purchase by NETS (electronic payment), credit card or cash.

The probability that a customer makes payment by NETS is $\frac{2}{3}$ and the probability that payment is made by credit card is $\frac{1}{4}$.

(i) Find the probability that a customer pays by cash.

Answer ..... [1]

(ii) Two customers are paying for their purchases.

Find the probability that

(a) both customers pay by credit card,

Answer ..... [1]

(b) no cash is used when they make their payments.

Answer ..... [1]

(iii) Three customers are paying for their purchases.

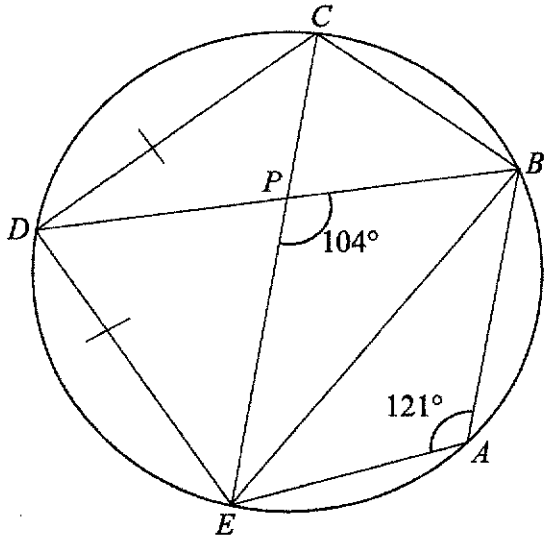
Find the probability that the first cash transaction occurs with the third customer and not before.

Answer ..... [2]

PartnerInLearning
408
www.testpapersfree.com

Downloaded from SingaKids.com

9 In the diagram, not drawn to scale, A, B, C, D and E are points on the circle.
CPE and BPD are straight lines.
It is given that $DC = DE$, angle $EPB = 104°$ and angle $BAE = 121°$.



(a) Find angle BDE.

Answer .....° [1]

(b) Hence show that angle $DEC = 45°$. [1]

(c) Prove that CE is the diameter of the circle.

Answer .....

..... [2]

(d) Hence find angle CDB.

Answer .....° [1]

PartnerInLearning
www.testpapersfree.com

Downloaded from SingaKids.com

(e) Find angle *BEP*.

Answer .....° [1]

(f) Explain why *P* cannot be the centre of the circle.

Answer .....

..... [2]

(g) It is further given that $EP = 9$ cm.

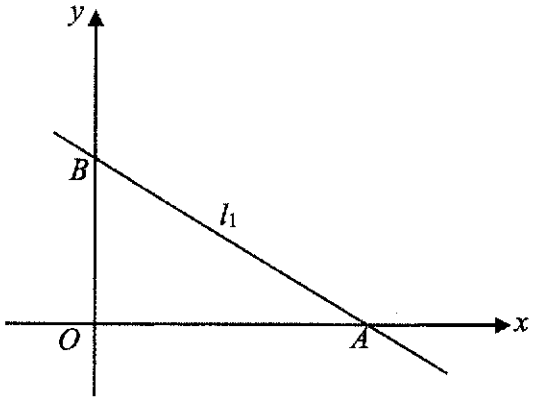
Find the length of *DP*.

Answer ..... cm [2]

PartnerInLearning
410
www.testpapersfree.com

Downloaded from SingaKids.com

10 The equation of the line l_1 is $x + 4y = 20$.
The line cuts the x-axis at point A and the y-axis at point B.



(a) Find the length of AB.

Answer ..... units [3]

A point C lies on the line l_1 such that it is equidistant from the coordinate axes.

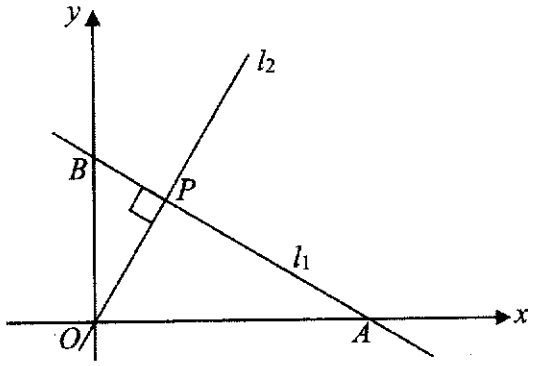
(b) Show that the coordinates of point C is (4, 4). [2]

Answer

PartnerInLearning
www.testpapersfree.com

Downloaded from SingaKids.com

Another line l_2, which is perpendicular to l_1, passes through the origin O and intersects l_1 at P.



(c) The product (gradient of AB) × (gradient of OP) = -1.

Use this information to find the equation of the line OP.

Answer ..... [3]

(d) Hence find the coordinates of P.

Answer (..... , ...) [2]

(e) State a pair of similar triangles from the diagram.

Answer ..... and ..... [1]

PartnerInLearning
412
www.testpapersfree.com

Downloaded from SingaKids.com

BLANK PAGE

PartnerInLearning
www.testpapersfree.com

Downloaded from SingaKids.com

11 Rebecca always travels by taxi to work.
To get a taxi, she has two options.
She can either flag down a taxi at the roadside, or book one via a mobile app.
The fare calculation for each option is as shown below.

Option 1: Flag down a taxi at the roadside.

Flag Down charge (First 1 km or less)	$3.20
1) Every 450 m thereafter or less up to 10 km 2) Every 350 m thereafter or less after 10 km 3) Every 45 seconds of waiting* time or less	$0.22
Surcharges	
Monday – Friday (Except Public Holidays): 06 00 to 09 29 Monday – Sunday & Public Holidays: 18 00 to 23 59	25% of metered fare
Midnight to Before 05 59	50% of metered fare
* *Waiting time refers to time during journey when vehicle is not moving due to traffic light or road congestions.*	

[*resources: www.cdgtaxi.com.sg/ride-with-us/fares/* (modified)]

Option 2: Book a taxi via mobile app.

Fares are charged based on both the total distance travelled and the total time taken for the journey.

Base fare	$2.80
Per Kilometre fare (distance)	$0.50
Per Minute fare (time)	$0.15
Booking fee	
Current Booking fee	$3.30
Advance Booking fee (at least half an hour in advance)	$8.00
# For every confirmed ride, minimum fare is $6.00	

[*resources: www.cdgtaxi.com.sg/ride-with-us/fares/* (modified)]

For both options:
Rebecca works only on weekdays (Monday to Friday).
Her workplace is 17 km from home.
Her journey to work will take 25 minutes inclusive of 6 minutes of 'waiting' time.
In order to reach her workplace on time, she needs to get into a taxi by 07 30.

For option 2 only:
As a regular user of the taxi services, Rebecca holds a Loyalty card that will entitle her to a 20% discount for fare exceeding $10.00, if she chooses Option 2.

PartnerInLearning
414
www.testpapersfree.com

Downloaded from SingaKids.com

(a) How much does it cost Rebecca to travel by taxi to work on Monday if she chooses Option 1?

Answer $ ..... [4]

(b) Rebecca is required to work on all weekdays in August 2021, including 9 August National Day, which is a Public Holiday.

Suggest the **minimum** budget that Rebecca needs to set aside for transport to work in the month of August 2021.
Show your workings clearly. [7]

Answer

Work schedule for August 2021

Sun	Mon	Tue	Wed	Thu	Fri	Sat
1	2	3	4	5	6	7
8	9	10	11	12	13	14
15	16	17	18	19	20	21
22	23	24	25	26	27	28
29	30	31				

End of Paper

PartnerInLearning
www.testpapersfree.com
Downloaded from SingaKids.com

www.testpapersfree.com

Downloaded from SingaKids.com

Answer Key:

1. 60

2. 12.1, 9.80

3. (a) 10 (b) 5

4. (a) $2^2 \times 3^3 \times 5 \times 7$ (b) 120

5. $x = \pm\sqrt{\dfrac{y^3+9}{18}}$

6. $x = 2, y = -3$

7. (a) 2.983×10^8 (b) 33.5

8. \$4 887.50

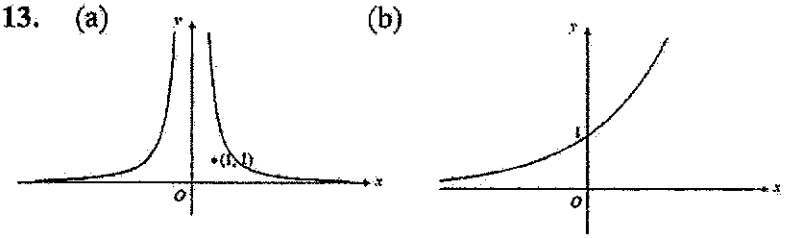
9. (a) 140 (b) 9

10. (a) 250 000 (b) 5.25

11. $OW = OZ$ (radii of larger circle); $OX = OY$ (radii of smaller circle);
$\angle WOX = \angle ZOY$ (vert. opp. angles) so $\Delta WOX \equiv \Delta ZOY$ (SAS)

12. 14.6

13. (a) (b)



14. (a) $-\dfrac{3}{5}$ (b) $\dfrac{4}{9}$ (c) $\dfrac{6}{5}$

15. (a) $0.5(8^2)\theta = 57.5$; $\theta = \dfrac{57.5(2)}{8^2} = = 1.796875 = 1.797$ radians (b) 24.4

16. (a) $p = \dfrac{1}{3}$, $q = \dfrac{3}{17}$ (b)(i) $\dfrac{8}{51}$ (ii) $\dfrac{104}{153}$

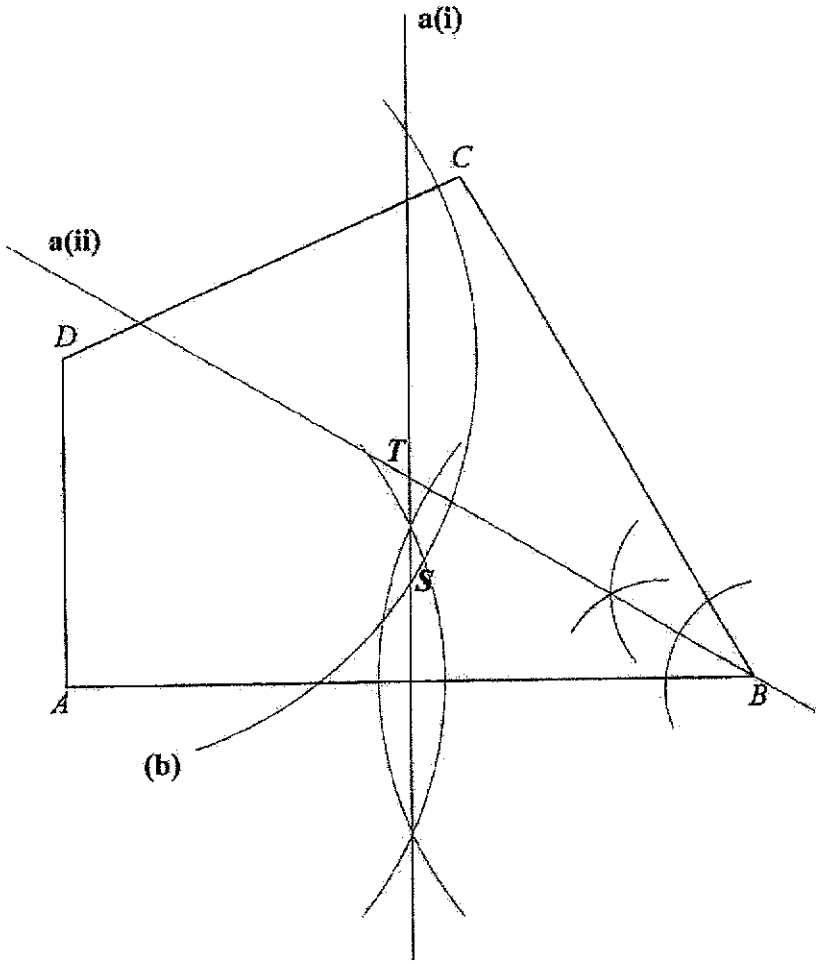
17. (a) (–5, 0) (b) $p = -2, q = 15$ (c) (0, 15)

18. (a) $a = 132, b = 11, c = 121$ (b) $n(n + 1)$
(c) When n is odd, $(n + 1)$ is even, product of $n(n + 1)$ is even.
When n is even, $(n + 1)$ is odd, product of $n(n + 1)$ is still even.
So for all values of n, the value of a is even. (shown)

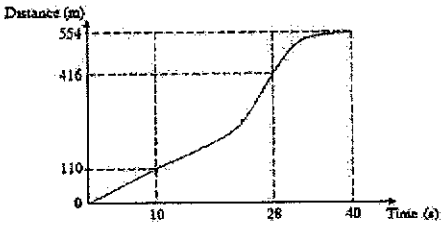
19. (a) 56 (b) 124 (c) 112

www.testpapersfree.com
Downloaded from SingaKids.com

20.



21. (a) 1.92 (b) 16.3 (c)



22. (a) 8 (b) 133
(c) The curve will be shifted to the right and it will be steeper.

PartnerInLearning
418
www.testpapersfree.com

Downloaded from SingaKids.com

Downloaded from SingaKids.com

BLANK PAGE

Answers to Paper 2:

1 (a) $x > -2$, **(b)** $\frac{1}{4a^2b^5}$, **(c)** $\frac{2x+11}{(2x-3)(x+2)}$, **(d)** $\frac{2u+v}{3v}$

3 (a) 357 cm^3, **(b)** claim is correct

4 (a)(i) $\frac{35}{x}$ h, **(ii)** $\frac{35}{x+4}$ h, **(c)** 18.6 or –22.6, **(d)** 1.88 hours

5 (a) $x = 5$ and $y = 1$, **(b)(i)** $\begin{pmatrix}300\\270\end{pmatrix}$, **(ii)(a)** $\begin{pmatrix}2310\\840\end{pmatrix}$, **(ii)(b)** amount of calories consumed for 'Monday to Friday' and 'Saturday and Sunday' respectively, **(iii)(a)** (450), **(iii)(b)** **average amount** of calories consumed per day in that week, **(iv)** 1995 calories

6 (a) $k = -1$, **(c)** $x \approx -1.9$ or 0.4 or 1.5, **(d)** 3.375, **(e)(ii)** $a = 6$ and $b = -2$

7 (a)(i) 230°, **(ii)** 94.1°, **(iii)** 698 m^2, **(b)** 25.4 m, **(c)** 9.0°

8 (a)(i) 58.5 marks, **(ii)** because there was an outlier of 18 marks, **(iii)** 66 marks, **(iv)** 13.2 marks, **(v)** marks obtained by the second group of students was more consistent because their SD was smaller

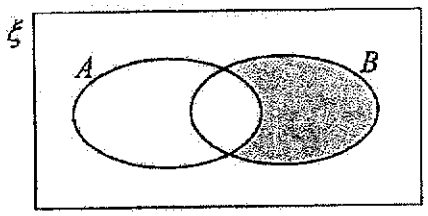
8 (b)(i) $\frac{1}{12}$, **(ii)(a)** $\frac{1}{16}$, **(ii)(b)** $\frac{121}{144}$, **(iii)** $\frac{121}{1728}$

9 (a) 59°, **(b)** 45°, **(d)** 31°, **(e)** 31°, **(g)** 7.42 cm,

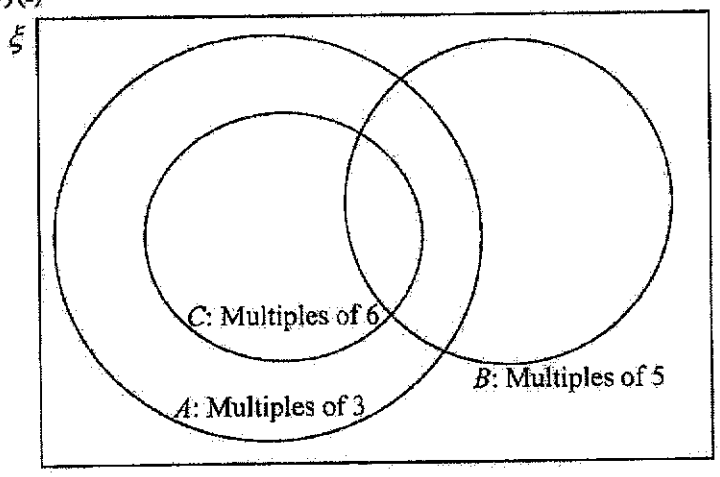
10 (a) 20.6 units, **(c)** $y = 4x$, **(d)** $P = (1\frac{3}{17}, 4\frac{12}{17})$, () AOB and APO (or BOA and BPO, or BPO and OPA)

11 (a) \$17.20, **(b)** \$323 [accept \$323 – \$330]

2 (a)



(b)(i)



(ii) $51 \notin B$

PartnerInLearning
420
www.testpapersfree.com

Downloaded from SingaKids.com