

Answer all the questions

The total number of marks for this paper is 80.

[s]

1. (a) Calculate $\sqrt[3]{\frac{-552 - \frac{4}{7}}{0.453 - 2.401}}$, giving your answer correct to 4 significant figures.

(b) Express 2.93 in its percentage form.

Answer (a) [1]

(b)% [1]

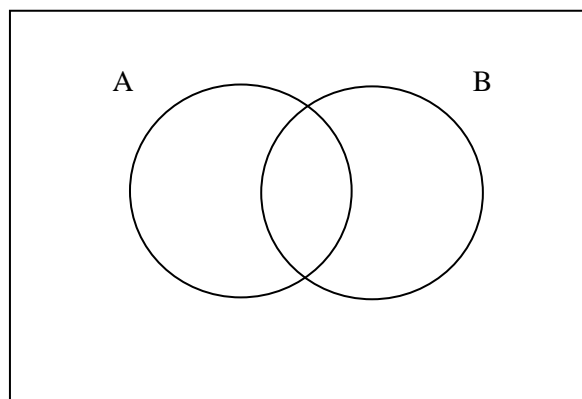
[s]

2. 7.056 watts can be written as q kilowatts. Find q . (1 kilowatts = 1×10^3 watts)

Answer [1]

[s]

3. On the Venn diagram, shade the region which represents $A' \cap B$. [1]



- [s]
4. The mean, median and modal mass of a group of 4 boys are 66.3 kg, 67.5 kg, and 68 kg respectively.
If two boys have the same mass of 68 kg,

(a) Write down the mass of each boy in descending order.

Answer kg, kg, kg, kg, [2]

- (b) If a fifth boy joins the group, what is his mass such that the mean mass of the boys is now 68.7 kg?

Answerkg [2]

- [m]
5. Ayra wants to invest \$25000 in a savings account for 6 years.
She finds the following information on two savings plans at a bank.
Which of these savings plans should she choose in order to have more money at the end of 6 years. Show your working clearly.

<p style="text-align: center;">Plan A</p> <p>Compound interest of 1.5% per year</p> <p style="text-align: center;">Plan B</p> <p>Simple interest of 4% per year</p>

Answer Plan..... because[3]

[m]

6. (a) Express 315 as a product of its prime factors.
- (b) On National Day, Mrs Audra distributed 315 flags and 90 bookmarks equally among the students in her classes.
Given that each student received the same number of flags and bookmarks with no leftover,
- (i) find the largest possible number of students that received both flag and bookmark.
 - (ii) find the number of flags each student received.

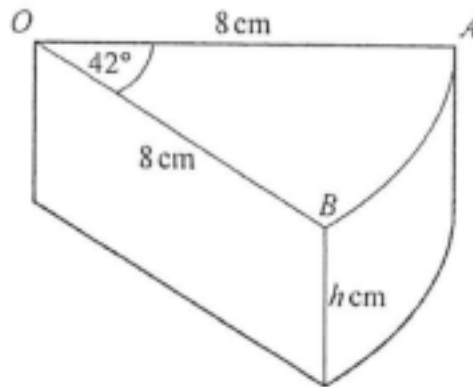
Answer (a) [1]

(bi)..... [1]

(bii) [1]

[m]

7. A wedge of cheese in the shape of a prism has a height of h cm. AB is an arc with centre O and has a radius of 8 cm. $\angle AOB = 42^\circ$.



- (a) The volume of the wedge of cheese is 100 cm^3 . Show that h is 4.26 cm correct to 2 decimal places.

Answer [2]

- (b) Calculate the total surface area of the wedge of cheese.

Answer cm^2 [3]

[m]

8. The boiling point of a gas is -57°C .
The temperature difference between its boiling point and its melting point is 36°C .
Note: Boiling point is higher than melting point.
(a) Find the melting point of the gas.

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

- (b) When the gas is placed in a super-cold room, its melting point decreased by $x^{\circ}\text{C}$ and its boiling point increased by $y^{\circ}\text{C}$.

Find the temperature difference between the melting point and the boiling point of this gas when it is placed in the super-cold room, in terms of x and y .

Answer $^{\circ}\text{C}$ [2]

[c]

9. There are three kettles, R , S and T of different sizes but geometrically similar in shape and having circular base.

The capacity of R and S are 216 cm^3 and 512 cm^3 respectively.

- (a) Find the ratio of the height of R to S .

Answer : [1]

- (b) The volume of T is given by the formula $V = \frac{3}{5} r^2 h$ where h is the height of the kettle and r the radius of the circular base.

Find the volume of X which has $\frac{3}{4}$ the height of T and thrice the radius of the circular base of T , in terms of r and h .

Answer cm^3 [2]

- (c) Hence, find the ratio of volume of T to the volume of X .

Answer : [2]

[m]

10. An area of 125 km^2 is represented on a map by an area of 5 cm^2 .

(a) Find the scale of the map in the form $1 : n$.

Answer [2]

(b) Find the length of a jogging path on the map with an actual distance of 7.86 km , leaving your answers correct to 2 decimal places.

Answercm [2]

(c) Find the actual area of a garden if the area of the garden on the map is 1.2 cm^2 .

Answer km^2 . [2]

[c]

11. Kate bought a 700 square feet apartment in New York for 370 000 USD.

Mei bought a 100 m^2 apartment in Shanghai for 850 000 CNY.

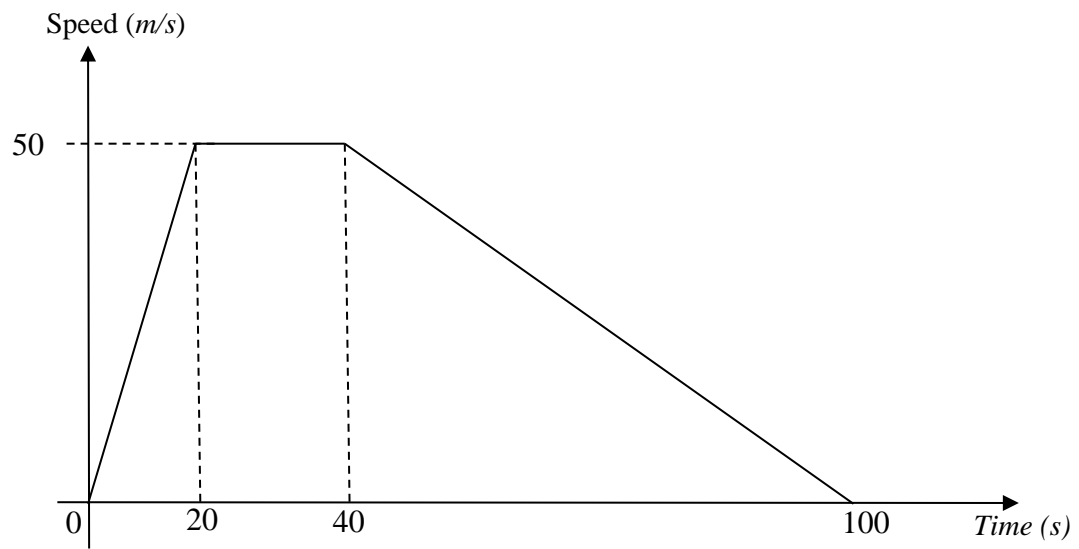
Given that: $1 \text{ USD} = 6.5 \text{ CNY}$

$1 \text{ square feet} = 0.093 \text{ m}^2$

Which apartment is cheaper based on per square foot? Show your calculations.

Answer [4]

[m]
12. The diagram below shows the speed-time graph of a van's journey.



(a) Calculate the acceleration when $t = 18$ s.

Answerm/s² [1]

(b) Calculate the time taken by the van to travel 1.2 km.

Answers [3]

[s]
13. (a) Simplify $5y - 2(x - 3y + 1)$.

Answer [1]

(b) Factorise $-4q^2 - pq + 3p^2$

Answer [1]

[c]
14. (a) The ratio of the distance from Station A to Station B and from Station B to Station C is 5 : 6.
Amsyar rides his e-scooter at a constant speed of 15 km/h from Station A and he took 10 minutes to reach Station B.
Find the distance between Station A to Station C.

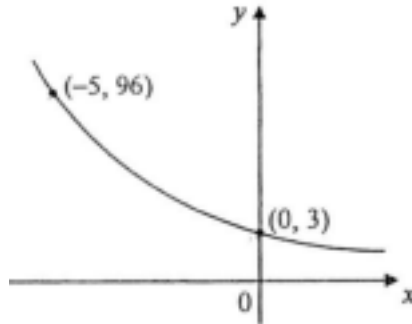
Answer km [2]

(b) The price of charging the e-scooter is \$1.50 per hour.
Amsyar is able to travel from Station A to Station C and back to Station A on a fully charged battery.
If he takes 45 minutes to fully charge the battery, how much will it cost him to ride from Station A to Station C?

Answer \$..... [2]

[m]

15. (a) The sketch shows the graph of $y = ka^x$. The points $(0, 3)$ and $(-5, 96)$ lie on the graph. Find the values of k and a .



Answer $k = \dots\dots\dots$ [1]

$a = \dots\dots\dots$ [1]

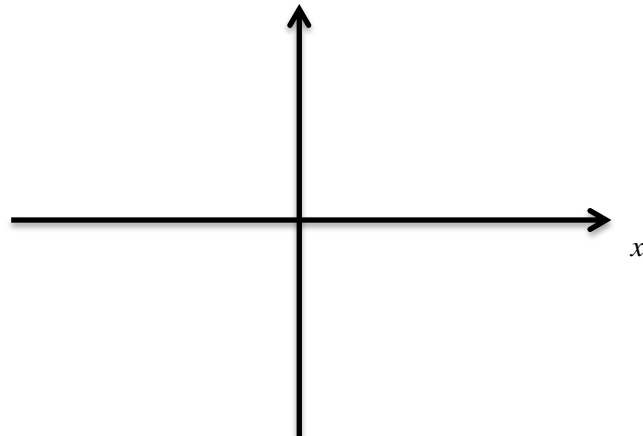
- (b) On the axes given, sketch the following graphs. In each case, state the line of symmetry.

(i) $y = -2x^3$

Line of symmetry:

y

[2]

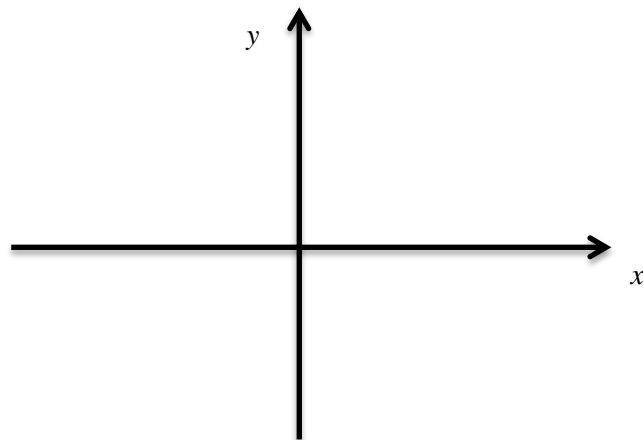


(ii) $y = \frac{1}{x^2}$

Line of symmetry:

y

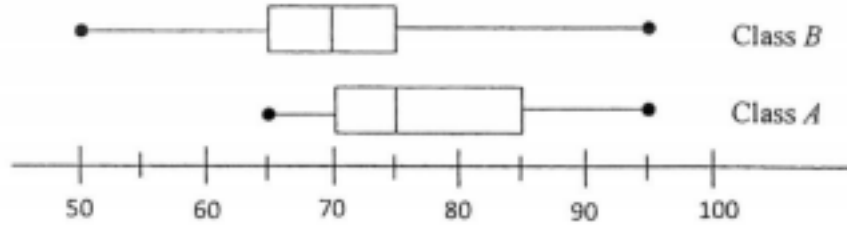
[2]



[s]

16. (a) Class A and Class B have 40 students each.

The box-and-whisker plots below show the distribution of marks in a Math test.



Find the number of students in, Class A, who scored less than 85 marks.

Answer [1]

(b) Below are two statements comparing the marks for Class A and Class B. For each one, write whether you agree or disagree, giving a reason for each answer. [2]

Statement	Agree/ Disagree	Reason
Students in Class A score better than students in Class B.		
Greater number of students in Class A score at least 70 marks compared to students in Class B.		

- [s]
17. A metal structure of an unknown material has a mass of 17.4 megagrams and has a volume of $1.2 \times 10^4 \text{ cm}^3$. (Mega = 10^6)

(a) Express 17.4 megagrams in kilograms, giving your answer in standard form.

Answer kg [1]

(b) Hence find the density of the structure in g/cm^3 , giving your answer in standard form.

Answer g/cm^3 [2]

(c) If a volume of 1000 cm^3 is cut off from the metal structure, what is the mass of the remaining metal?

Answer kg [1]

-
- [s]
18. (a) Solve the inequalities $5 - x < 4x - 1 \leq 3x + 1$.
Represent your solution on the number line below.



Answer [3]

(b) Hence write down the smallest integer value of x which satisfies

$$5 - x < 4x - 1 \leq 3x + 1$$

Answer [1]

[s]

19. (a) Simplify $\frac{(2a^{-3}b)a^2}{\sqrt{16b^2}}$, giving your answer in positive index.

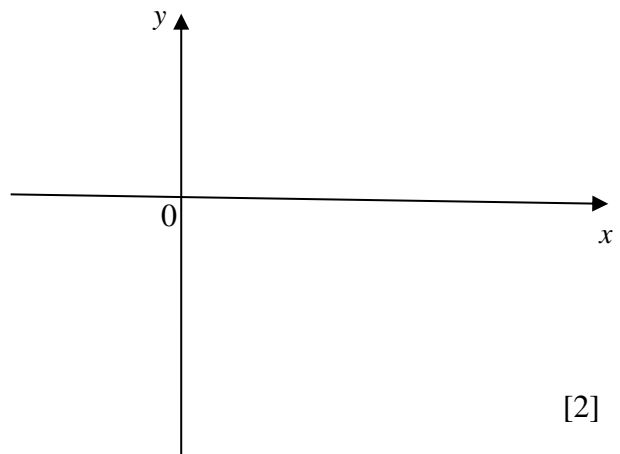
Answer [2]

(b) Given that $64^h = \frac{64}{16^a}$, express h in terms of a .

Answer [2]

[m]

20. (a) Sketch the graph of $y = -(x - 4)^2 + 3$.



(b) State the coordinates of the turning point of the graph $y = -(x - 4)^2 + 3$.

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

(c) Write down the equation of the line of symmetry.

Answer [1]

[s]

21. A is the point $(9, 12)$. B is the point $(-4, 1)$.

(a) Write down the column vector \overrightarrow{AB} .

Answer [1]

(b) Find $|\overrightarrow{AB}|$.

Answerunits [2]

[s]

22. Given that an interior angle of a regular polygon is 156° , calculate

(a) the exterior angle of the polygon,

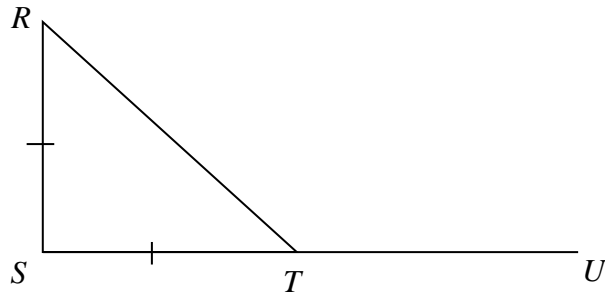
Answer (a) [1]

(b) the number of sides of the polygon,

Answer (b) [1]

[m]

23. In the diagram, angle $RST = 90^\circ$ and UTS is a straight line. $RS = ST$.



Without the use of calculators, find

(a) $\sin \angle SRT$,

(b) $\cos \angle RTU$.

Give both answers in the exact fraction form.

Answer (a) [2]

(b) [1]

End of Paper