

# 2021 YEAR 10 MATHEMATICS

## Written examination

Reading time: 15 minutes

Writing time: 3 hours

2021 version 1

## QUESTION BOOK

### Structure of book

<i>Section</i>	<i>Number of questions</i>	<i>Number of questions to be answered</i>	<i>Number of marks</i>
A	20	20	20
B	10	10	50
C	3	3	30
			Total 100

**Question 8**

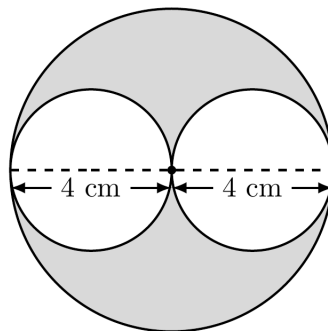
The sum of two positive integers is 12 and their difference is 8.  
The set of simultaneous equations that represent this problem is

- A.  $x - y = 12$  and  $x - y = 8$
- B.  $x + y = 12$  and  $x - y = 8$
- C.  $x - y = 12$  and  $x + y = 8$
- D.  $x - y = 12$  and  $x + y = 8$
- E.  $x + y = -8$  and  $x - y = 12$

**Question 9**

Factorising  $x^2 + 10x + 9$  results in

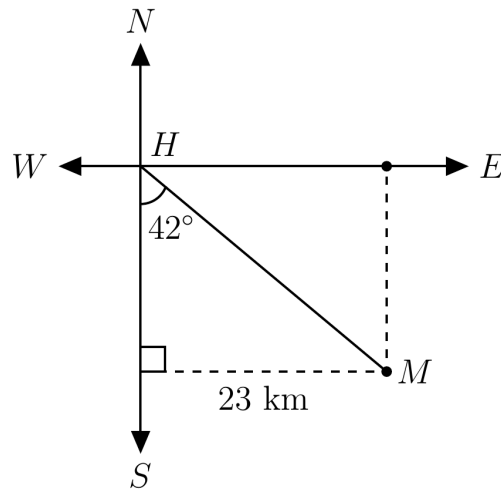
- A.  $(x + 1)(x + 9)$
- B.  $(x + 10)(x + 1)$
- C.  $(x - 1)(x + 9)$
- D.  $(x + 1)(x - 9)$
- E.  $(x - 1)(x - 9)$

**Question 10**

The area of the shaded region in the diagram above is closest to

- A.  $18.75 \text{ cm}^2$
- B.  $25.1 \text{ cm}^2$
- C.  $25.3 \text{ cm}^2$
- D.  $37.7 \text{ cm}^2$
- E.  $50.3 \text{ cm}^2$

The following information relates to Questions 13 – 14.



Gary travels from home ( $H$ ) to a point  $M$ .  
Once he is at point  $M$ , he is 23 km east from home.  
Finally, Gary travels north until he is due east from home.

**Question 13**

The bearing of  $M$  from  $H$  is

- A.  $021^\circ$
- B.  $042^\circ$
- C.  $048^\circ$
- D.  $132^\circ$
- E.  $138^\circ$

**Question 14**

The total distance that Gary travelled is closest to

- A. 20.1 km
- B. 25.5 km
- C. 30.9 km
- D. 59.9 km
- E. 61.9 km

The following information relates to Questions 17 – 19.

The number of complaints received at a call centre on 10 randomly selected days are shown below.

6, 6, 7, 9, 12, 12, 13, 15, 16, 28

It is given that the data value 28 is an outlier.

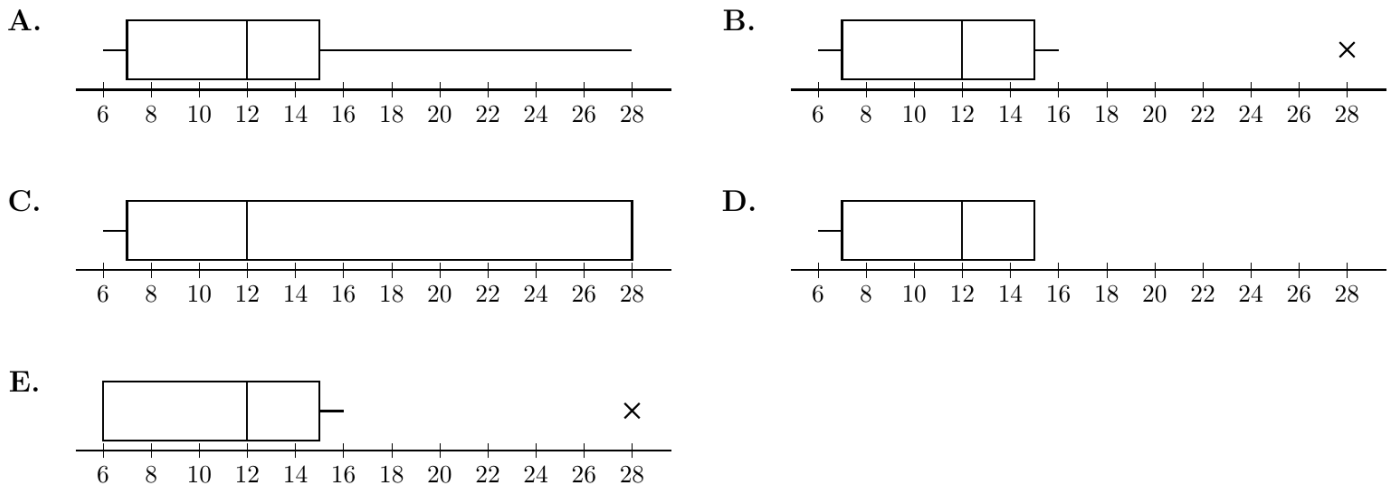
**Question 17**

The upper quartile for the sample data is

- A. 7
- B. 11.6
- C. 15
- D. 29
- E. 35

**Question 18**

Which one of the following is the correct box-and-whisker plot for the sample data?



**Question 19**

Which one of the following statements is **true**?

- A. there were at most 15 complaints on about 80% of days
- B. 35 is an outlier using the justification  $7 - 1.5 \times (15 - 7) < 28$
- C. the range of the sample data is 10
- D. the sample data is definitely representative of the underlying population
- E. the sample data seems to be bimodal

**Question 3** (5 marks)

Alec bought 5 identical calculators.

When Alec paid for the calculators \$200 in cash, he was given back \$25 for change.

Let the price of a calculator, in dollars, be  $p$ .

a. Write the total price of the calculators in terms  $p$ .

1 mark

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b. Form an equation in terms of  $p$  and use it to find the price of a single calculator.

2 marks

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c. Alec sells four calculators to his friends at school at a 30% markup.  
Find Alec's profit made on the four calculators.

2 marks

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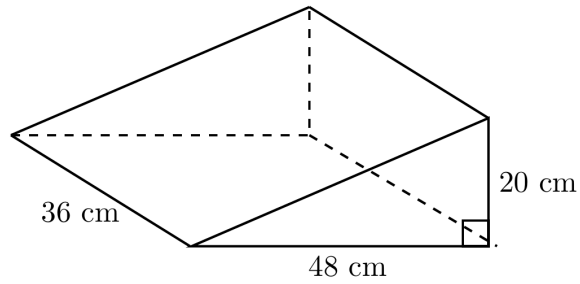
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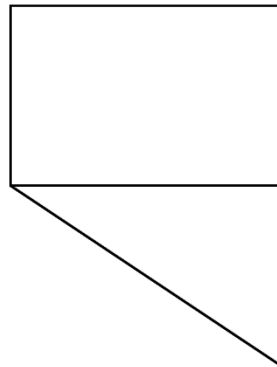
**Question 6** (5 marks)

Consider the following triangular prism.



- a. Complete the net diagram of the triangular prism shown below.  
Include any relevant measurements.

3 marks



- b. A string is used to trace the outer edges of the net diagram.  
What is the length of this string?

2 marks

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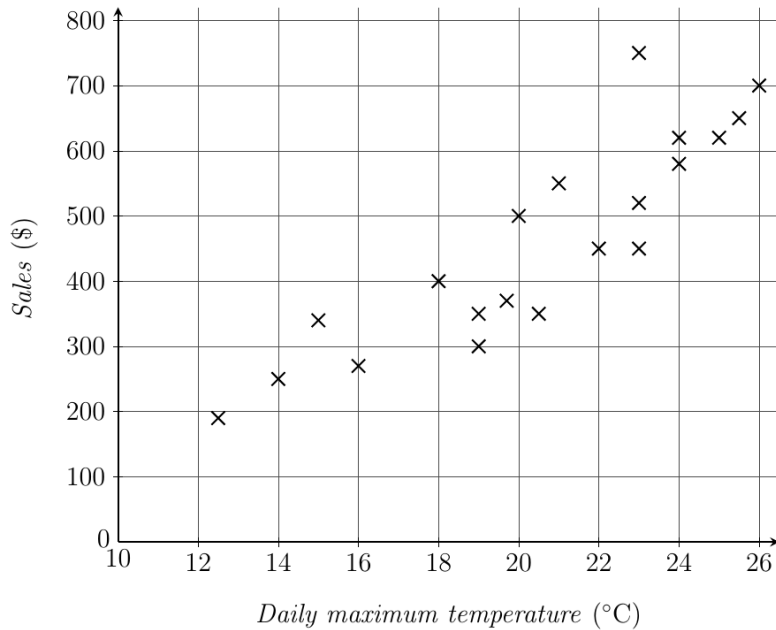
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**Question 10** (5 marks)

The sales performance at a frozen yogurt shop by daily maximum temperature on twenty randomly selected days is shown on the scatter plot below.



a. State the independent variable and the dependent variable.

1 mark

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b. Briefly describe the strength of the correlation between *maximum temperature* and *sales*.

2 marks

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c. Are there any outliers in this dataset?  
Justify your answer.

2 marks

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**SECTION C****Instructions for Section C**

Answer **all** questions.

In all questions where a numerical answer is required, an **exact** value must be given unless otherwise specified.

In questions where more than one mark is available, appropriate working **must** be shown.

Unless otherwise indicated, the diagrams in this book are **not** drawn to scale.

**Question 1** (10 marks)

**a.** Kay works as a stacker at Coles.

He usually works 38 hours per week at \$22.50 per hour.

**i.** If Kay works 38 hours per week for the next 3 months, show that his gross income will be \$10,260. 1 mark

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**ii.** When Kay is on holidays, he will be paid 17.5% p.a. leave loading. 2 marks  
How much will his holiday pay for one week be?

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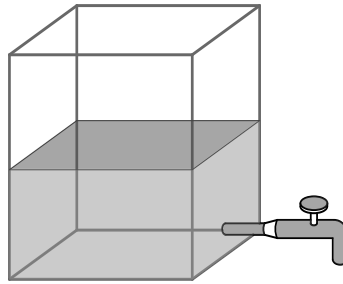


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**Question 2** (10 marks)

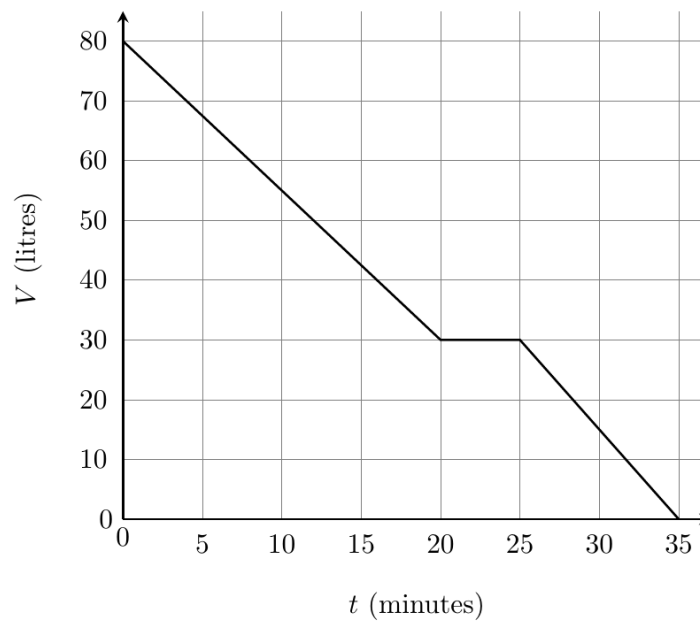
A water tank shown below was drained for cleaning.



The initial volume of water in the water tank was 80 litres.

It took 35 minutes to completely drain the water tank.

The graph below shows the amount of water remaining in the water tank,  $V$  litres, after  $t$  minutes.



- a.** Show that the water was drained at a rate of 2.5 litres per minute in the first 20 minutes. 2 marks

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- b.** Write down the equation relating  $V$  and  $t$  for the first 20 minutes. 1 mark

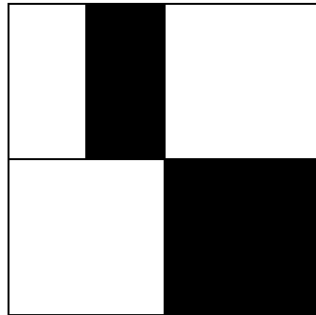
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**Question 3** (10 marks)

At a school camp, each child takes a turn throwing darts at the dartboard shown below. The square dartboard is made up of 4 smaller identical squares that have black or white parts. Assume that all darts thrown hit the dartboard in a random location.



- a. Show that the probability that the dart lands on a black region is  $\frac{3}{8}$ .

2 marks

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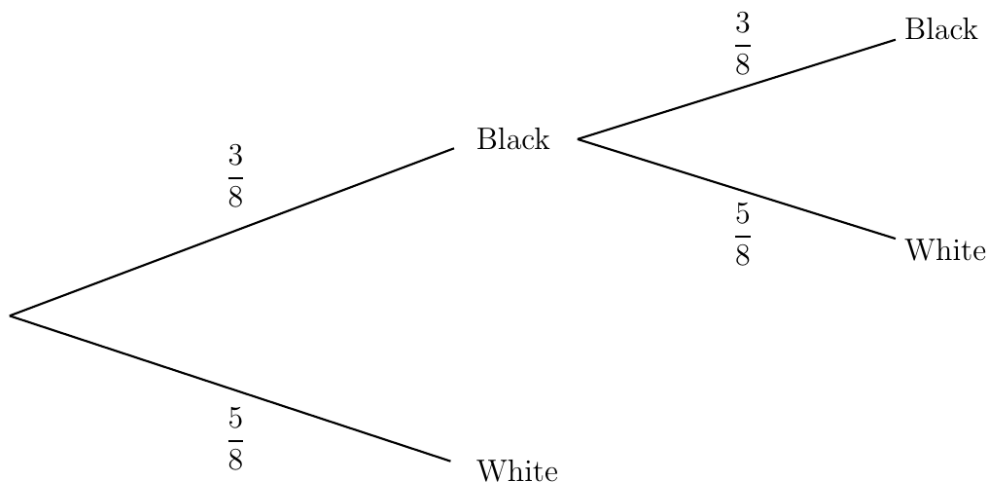
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- b. Complete the tree diagram below, showing all outcomes and probabilities.

2 marks



**SOLUTIONS****SECTION A**

<b>Question</b>	<b>Answer</b>
1	A
2	D
3	D
4	B
5	C
6	C
7	A
8	B
9	A
10	B
11	E
12	A
13	E
14	D
15	E
16	B
17	C
18	B
19	A
20	E

**Question 1**

$3\pi$  is an irrational number.

Answer is **A**.

**Question 2**

$$5(2x - 15) = 5x + 30$$

$$10x - 75 = 5x + 30$$

$$5x = 105$$

$$x = 21$$

Answer is **D**.

**Question 12**

$$\pi(3.2 \times 4)^2 \times (4.2 \times 4) = \pi(3.2)^2 \times 4.2 \times 4^3 \text{ cm}^3$$

Answer is **A**.

**Question 13**

The bearing of  $M$  from  $H$  is

$$180^\circ - 042^\circ = 138^\circ.$$

Answer is **E**.

**Question 14**

The total distance that Gary travels is

$$\frac{23}{\sin(42^\circ)} + \frac{23}{\tan(42^\circ)} \approx 59.9 \text{ km}$$

Answer is **D**.

**Question 15**

$$(n - 2) \times 180 = 135n$$

$$180n - 360 = 135n$$

$$45n = 360$$

$$n = 8$$

This is a regular octagon.

Answer is **E**.

**Question 16**

By the AAA test, triangle  $ANM$  and triangle  $ABC$  are similar.

Therefore

$$24 : 18 = x : 10$$

$$18x = 240$$

$$3x = 40$$

Answer is **B**.

**SECTION B****Question 1 (5 marks)**

**a.** 1 mark  
 $2.0 \times 10^9$  (A1)

**b.** 2 marks  
 $-25a - 10a^2 = -5a(5 + 2a)$

- The coefficient is  $-5$ . (A1)
- The final expression contains  $a(5 + 2a)$ . (A1)

**c.** 2 marks

$$\begin{aligned} \frac{x+3}{5} - \frac{3x}{2} &= \frac{2x+6}{10} - \frac{15x}{10} \\ &= \frac{-13x+6}{10} \end{aligned}$$

- Accept  $-\frac{13x-6}{10}$ .
- The numerator is correct. (A1)
- The denominator is correct. (A1)

**Question 2 (5 marks)**

**a.** 2 marks  
 $13000(1-0.28)^3$  (A1)  
 $\approx \$4,852.22$  (A1)

**b.** 3 marks  
 Let Shelly's initial investment be  $\$P$ .

$$P\left(1 + \frac{4.5}{100}\right)^2 - P = \$2,300.63 \quad (\text{A1})$$

$$P(1.045^2 - 1) = \$2,300.63 \quad (\text{A1})$$

$$\begin{aligned} P &= \frac{\$2,300.63}{1.045^2 - 1} \\ &\approx \$25,000 \quad (\text{A1}) \end{aligned}$$

**Question 3** (10 marks)**a.**

2 marks

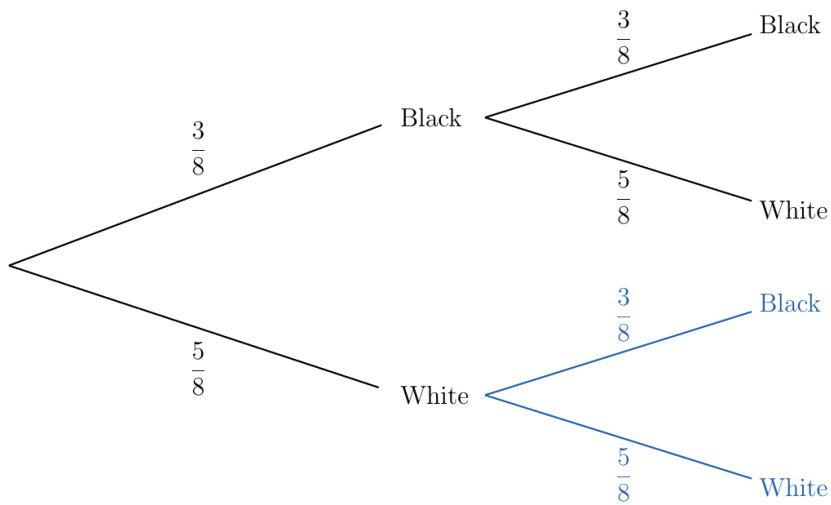
$$\frac{1}{8} + \frac{1}{4} \quad (\text{A1})$$

$$= \frac{1}{8} + \frac{2}{8}$$

$$= \frac{3}{8} \quad (\text{A1})$$

**b.**

2 marks



- Correct two outcomes are shown (Black and White). (A1)
- Correct probability for each of the two outcomes are shown. (A1)

**c.****i.**

2 marks

$$\frac{5}{8} \times \frac{5}{8} \quad (\text{A1})$$

$$= \frac{25}{64} \quad (\text{A1})$$

- Accept 0.3906.