Pearson Edexcel International GCSE

Mathematics A

Modular Unit 1

June 2024 Reconstructed Past Paper

DETAILED SOLUTIONS

Original question followed by a full worked solution

27 adaptive question sections 96 marks

Selected from Linear Higher Papers 1H and 2H

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L-to-M | CONVERTED MODULAR EDITION

Selected from Linear Higher papers; not an original Modular examination paper.

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About this reconstructed paper

Each question section appears in the same order as the Student book: the complete source demand is followed by its demand-local worked solution and final answer.

Ownership rule: Unit 2 owns a demand when its assessed or terminal statement is Unit 2, even if Unit 1 skills are prerequisites. For example, drawing boundary lines supports the Unit 2 region-of-inequalities demand. This book contains the demands owned by Unit 1; the selection contains 96 marks.

This is an Elite reconstructed teaching paper selected from official Linear Higher material; it is not an official Pearson Modular examination paper. Source assets are retained for private teaching use.

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Question 01
4MA1-1H Q2

ORIGINAL QUESTION
4 marks

2 450 students were asked how they travelled to school on Monday.
Each student walked or travelled by bus or travelled by car or travelled by bicycle.
Each student used just one method of travel.

One of these students is chosen at random.
The table shows information about the probability of each method of travel.

Method of travel	walk	bus	car	bicycle
Probability	0.20	x	$2x$	0.26

Work out how many of the 450 students travelled by car.

.....

Worked Solution 01

Probability to frequency

MODULAR UNIT 1

4 marks

Complete the probability total

$$0.20 + x + 2x + 0.26 = 1 \Rightarrow x = 0.18.$$

Car frequency

$$P(\text{car}) = 0.36, \quad 450(0.36) = 162.$$

Final answer

162 students

Question 02
4MA1-1H Q6

ORIGINAL QUESTION
2 marks

6 (a) Expand and simplify $(m + 5)(m - 8)$

.....

(2)

Worked Solution 02

Expand brackets

MODULAR UNIT 1

2 marks

Expand

$$(m+5)(m-8) = m^2 - 3m - 40.$$

Final answer

$$m^2 - 3m - 40$$

Question 03

4MA1-1H Q6

ORIGINAL QUESTION

3 marks

(b) Solve $3n - 4 = \dfrac{5n + 6}{3}$

Show clear algebraic working.

$n =$ .....

(3)

Worked Solution 03

Solve a linear equation

MODULAR UNIT 1

3 marks

Clear the denominator

$$3n - 4 = \frac{5n + 6}{3} \Rightarrow 9n - 12 = 5n + 6.$$

Solve

$$4n = 18 \Rightarrow n = \frac{9}{2}.$$

Final answer

$$n = \frac{9}{2}$$

Question 04
4MA1-1H Q7

ORIGINAL QUESTION
5 marks

7 $\mathscr{E} = \{23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34\}$
$A = \{\text{even numbers}\}$
$B = \{23, 29, 31\}$
$C = \{\text{multiples of 3}\}$

(a) List the members of the set

(i) $B \cup C$

.....

(1)

(ii) $A' \cap C$

.....

(1)

(b) Is it true that $B \cap C = \varnothing$?

Tick (✓) one of the boxes below.

Yes	No
☐	☐

Give a reason for your answer.

.....

.....

(1)

The set D has 4 members and is such that $D \cap (A \cup C) = \varnothing$

(c) List the members of set D

.....

(2)

Worked Solution 04

Set notation

MODULAR UNIT 1

5 marks

Union and intersection

$$B \cup C = \{23, 24, 27, 29, 30, 31, 33\}, \quad A' \cap C = \{27, 33\}.$$

Empty intersection

$B \cap C = \varnothing$, so the statement is true.

Complement

$$D = (A \cup C)' = \{23, 25, 29, 31\}.$$

Final answer

$$\{23, 24, 27, 29, 30, 31, 33\};\ \{27, 33\};\ \text{Yes};\ D = \{23, 25, 29, 31\}$$

Question 05
4MA1-1H Q8

ORIGINAL QUESTION
3 marks

8 A cylinder is placed on a table.

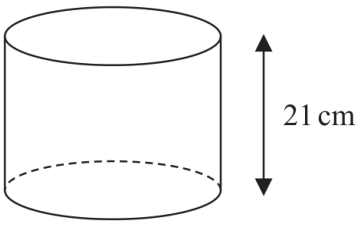


Diagram **NOT** accurately drawn

The volume of the cylinder is $1575\,cm^3$
The force exerted by the cylinder on the table is 84 newtons.

$$\text{pressure} = \frac{\text{force}}{\text{area}}$$

Work out the pressure on the table due to the cylinder.

..... newtons/cm^2

Worked Solution 05

Pressure

MODULAR UNIT 1

3 marks

Contact area

$$A = 1575 \div 21 = 75 \text{ cm}^2.$$

Pressure

$$84 \div 75 = 1.12.$$

Final answer

$$1.12 \text{ N/cm}^2$$

Question 06
4MA1-1H Q10

ORIGINAL QUESTION
4 marks

10 (a) Simplify $(2p)^0$ where $p > 0$

.....
(1)

$y^9 \times y^{-3} = y^n$

(b) Find the value of n

$n =$ .....
(1)

(c) Simplify fully $(5a^4c^2)^3$

.....
(2)

Worked Solution 06

Index laws

MODULAR UNIT 1

4 marks

Zero power

$$(2p)^0 = 1.$$

Product

$$y^9 y^{-3} = y^6 \Rightarrow n = 6.$$

Power of a product

$$(5a^4c^2)^3 = 125a^{12}c^6.$$

Final answer

$$1; \quad n = 6; \quad 125a^{12}c^6$$

Question 07
4MA1-1H Q11

ORIGINAL QUESTION
4 marks

11 The diagram shows a roof support.

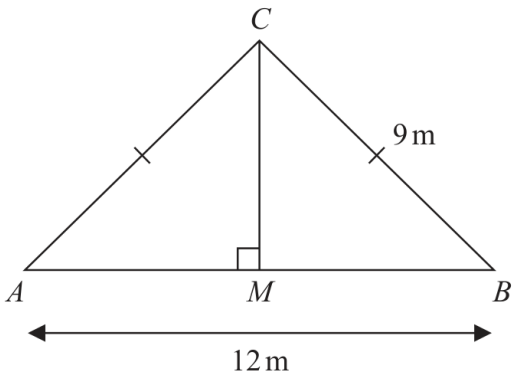


Diagram **NOT** accurately drawn

The roof support is made from four lengths of wood, AB, AC, BC and MC

$AC = BC = 9\,\text{m}$ $AB = 12\,\text{m}$

angle $AMC = 90°$

Lewis is going to buy lengths of wood to make the roof support.

The wood costs 21.50 euros per metre.
Each length of wood he buys has to be a whole number of metres.

Work out the total cost of the wood Lewis needs to buy.
Show your working clearly.

..... euros

Worked Solution 07

Pythagoras and purchase length

MODULAR UNIT 1

4 marks

Central support

$$AM = 6, \quad CM = \sqrt{9^2 - 6^2} = \sqrt{45} = 6.708\ldots$$

Whole metres

$$12 + 9 + 9 + 7 = 37 \text{ m}; \quad 37(21.50) = 795.50.$$

Final answer

$$\text{EUR } 795.50$$

Question 08
4MA1-1H Q12

ORIGINAL QUESTION
2 marks

12 (a) Factorise fully $6y^2 - 5y - 4$

.....

(2)

Worked Solution 08

Factorise a quadratic

MODULAR UNIT 1

2 marks

Factorise

$$6y^2 - 5y - 4 = (2y + 1)(3y - 4).$$

Final answer

$$(2y + 1)(3y - 4)$$

Question 09

4MA1-1H Q12

ORIGINAL QUESTION

3 marks

(b) Express $\frac{2x+1}{4x} + \frac{7-5x}{3x}$ as a single fraction in its simplest form.

.....

(3)

Worked Solution 09

Algebraic fractions

MODULAR UNIT 1

3 marks

Use a common denominator

$$\frac{2x+1}{4x}+\frac{7-5x}{3x}=\frac{3(2x+1)+4(7-5x)}{12x}=\frac{31-14x}{12x}.$$

Final answer

$$\frac{31-14x}{12x}$$

Question 10
4MA1-1H Q13

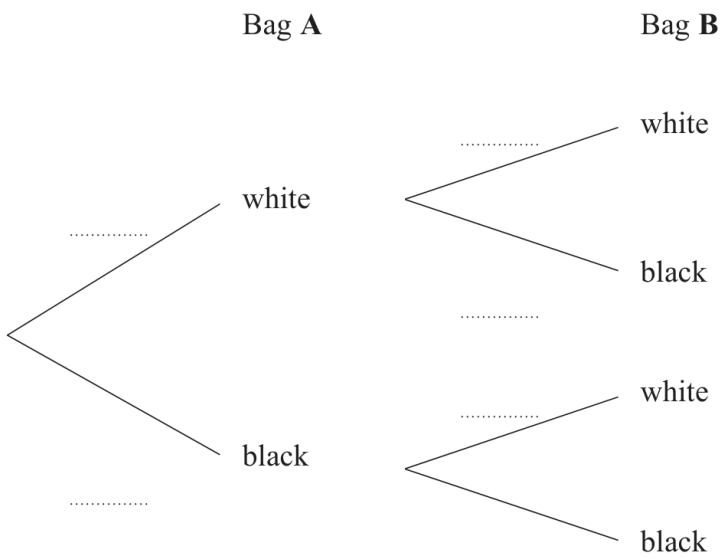
ORIGINAL QUESTION
5 marks

13 Harman has two bags of beads.

In bag **A**, there are 3 white beads and 7 black beads.
In bag **B**, there are 5 white beads and 4 black beads.

Harman takes at random a bead from bag **A** and a bead from bag **B**

(a) Complete the probability tree diagram.



(2)

(b) Work out the probability that Harman takes two beads of the same colour.

.....

(3)

Worked Solution 10

Probability tree

MODULAR UNIT 1

5 marks

Branches

$$A : (3/10, 7/10), \quad B : (5/9, 4/9).$$

Same colour

$$(3/10)(5/9) + (7/10)(4/9) = 43/90.$$

Final answer

$$\frac{43}{90}$$

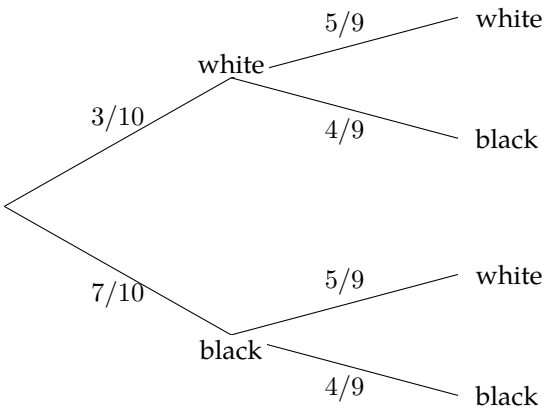
Completed diagram 10

Probability tree

MODULAR UNIT 1

5 marks

Completed solution diagram: Probability tree



Question 11
4MA1-1H Q16

ORIGINAL QUESTION
4 marks

16 There are 20 sweets in a box.

15 of the sweets are red
5 of the sweets are yellow

Fred takes at random 3 sweets from the box.

Work out the probability that Fred takes at least one sweet of each colour from the box.

.....

Worked Solution 11

At least one of each colour

MODULAR UNIT 1

4 marks

Complement

$$1-\frac{15}{20}\frac{14}{19}\frac{13}{18}-\frac{5}{20}\frac{4}{19}\frac{3}{18}=\frac{45}{76}.$$

Final answer

$$\frac{45}{76}$$

Question 12

4MA1-1H Q17

ORIGINAL QUESTION

3 marks

17 Show that $\dfrac{1+\sqrt{5}}{3-\sqrt{5}}$ can be written in the form $a+\sqrt{b}$ where a and b are integers.

Show each stage of your working clearly.

Worked Solution 12

Rationalise the denominator

MODULAR UNIT 1

3 marks

Conjugate

$$\frac{1+\sqrt{5}}{3-\sqrt{5}}\frac{3+\sqrt{5}}{3+\sqrt{5}}=\frac{8+4\sqrt{5}}{4}.$$

Final answer

$$2+\sqrt{5}$$

Question 13
4MA1-1H Q19

ORIGINAL QUESTION
5 marks

19 Here is quadrilateral $ABCD$

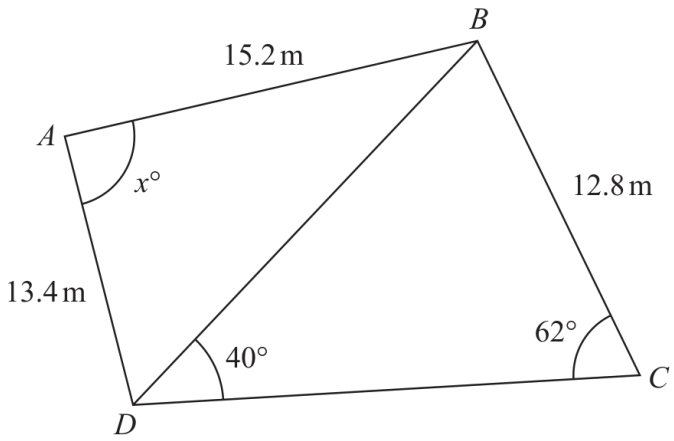


Diagram **NOT** accurately drawn

Work out the value of x
Give your answer correct to 3 significant figures.

$x =$ .....

Worked Solution 13

Sine rule and cosine rule

MODULAR UNIT 1

5 marks

Diagonal

$$BD = 12.8 \sin 62^\circ / \sin 40^\circ = 17.582\ldots$$

Required angle

$$\cos x = \frac{13.4^2 + 15.2^2 - BD^2}{2(13.4)(15.2)}.$$

Final answer

$$75.6^\circ$$

Question 14
4MA1-1H Q20

ORIGINAL QUESTION
4 marks

20 The diagram shows a sector $OABC$ of a circle centre O

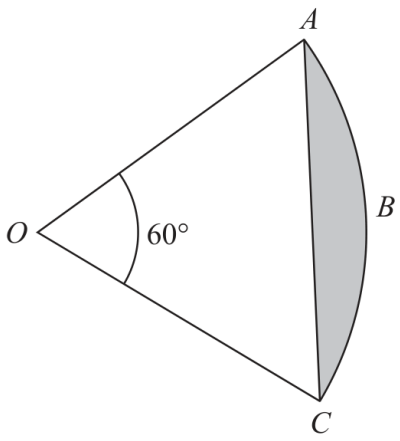


Diagram **NOT** accurately drawn

Angle $AOC = 60°$

The area of the shaded segment ABC is $38\,\text{cm}^2$

Work out the perimeter of the shaded segment ABC
Give your answer correct to one decimal place.

..... cm

Worked Solution 14

Circular segment

MODULAR UNIT 1

4 marks

Radius

$$38 = r^2(\pi/6 - \sqrt{3}/4) \Rightarrow r = 20.4815\ldots$$

Perimeter

$$r + \pi r/3 = 41.9\ \text{cm}.$$

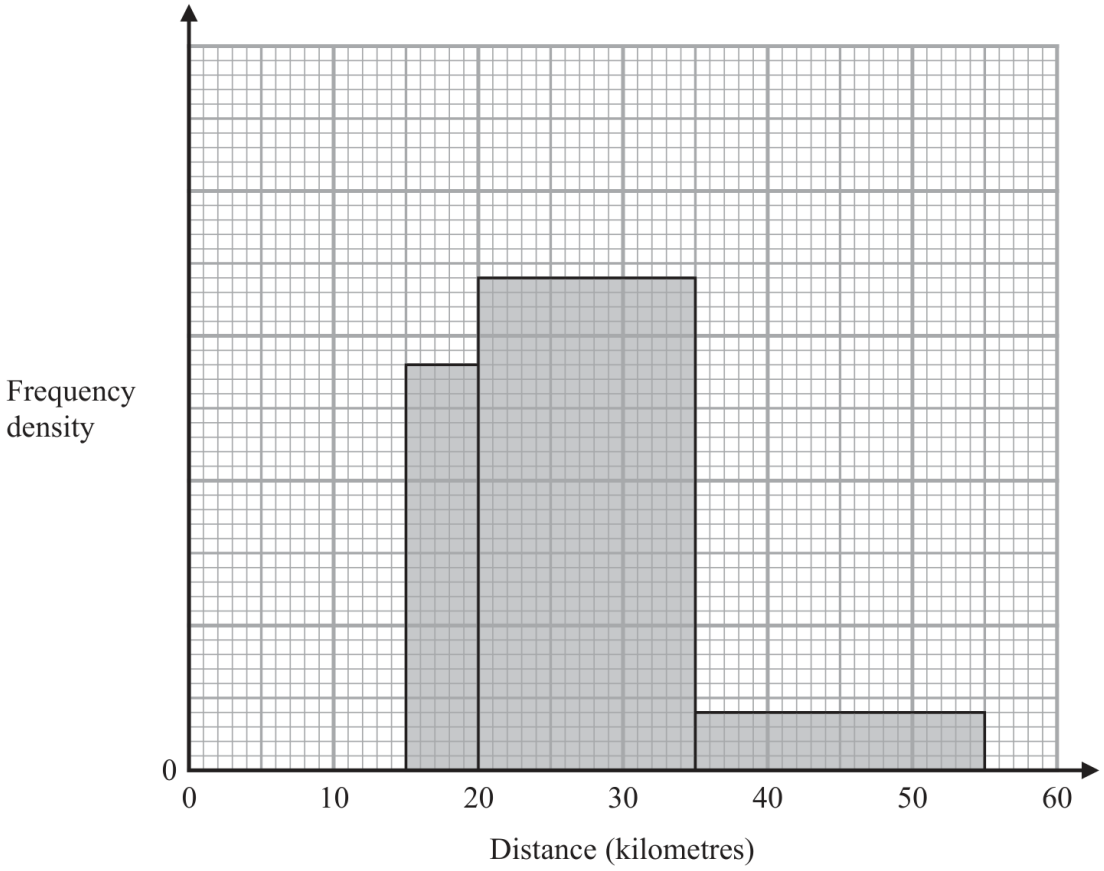
Final answer

$$41.9\ \text{cm}$$

Question 15
4MA1-1H Q22

ORIGINAL QUESTION
3 marks

22 The incomplete histogram shows some information about the distances, in kilometres, that 100 adults ran last week.



All of the adults ran at least 5 kilometres.
None of the adults ran more than 55 kilometres.
14 adults ran between 15 kilometres and 20 kilometres.

Complete the histogram.

Worked Solution 15

Complete a histogram

MODULAR UNIT 1

3 marks

Scale

$$15 \le d < 20 : \ 14/5 = 2.8 \text{ frequency density.}$$

Missing class

$$\text{Known frequency} = 14 + 51 + 8 = 73, \quad 100 - 73 = 27.$$

Bar

$$5 \le d < 15 \text{ has density } 27/10 = 2.7.$$

Final answer

$$\text{Draw the } 5 \le d < 15 \text{ bar at density } 2.7$$

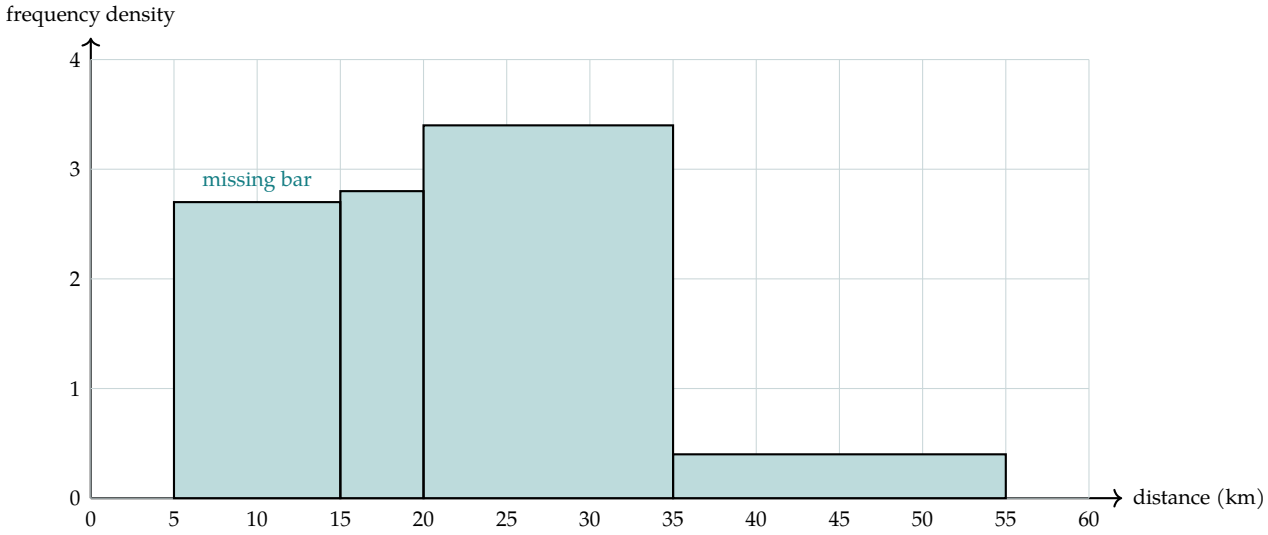
Completed diagram 15

Complete a histogram

MODULAR UNIT 1

3 marks

Completed solution diagram: Completed histogram



Question 16

4MA1-1H Q25

ORIGINAL QUESTION

4 marks

25 $f(x) = 17 - 3x^2 + 12x$

Write $f(x)$ in the form $a - b(x - c)^2$ where a, b and c are constants.

$f(x) =$ .....

Worked Solution 16

Complete the square

MODULAR UNIT 1

4 marks

Rearrange

$$17 - 3x^2 + 12x = 17 - 3[(x-2)^2 - 4].$$

Final answer

$$29 - 3(x-2)^2$$

Question 17
4MA1-2H Q3

ORIGINAL QUESTION
3 marks

3 A plane takes 9 hours 36 minutes to fly from New Delhi to Perth.

The plane flies at an average speed of 820 km/h.

Work out the total distance the plane flies.

..... km

Worked Solution 17

Speed, distance and time

MODULAR UNIT 1

3 marks

Time

$$9 \text{ h } 36 \text{ min} = 9.6 \text{ h}.$$

Distance

$$820(9.6) = 7872.$$

Final answer

$$7872 \text{ km}$$

Question 18

4MA1-2H Q4

ORIGINAL QUESTION

3 marks

4 Show that $2\frac{4}{7} \times 3\frac{1}{9} = 8$

Worked Solution 18

Mixed-number multiplication

MODULAR UNIT 1

3 marks

Improper fractions

$$2\frac{4}{7} = 18/7, \quad 3\frac{1}{9} = 28/9.$$

Multiply

$$(18/7)(28/9) = 8.$$

Final answer

$$8$$

Question 19
4MA1-2H Q5

ORIGINAL QUESTION
3 marks

5 The diagram shows triangle ABC

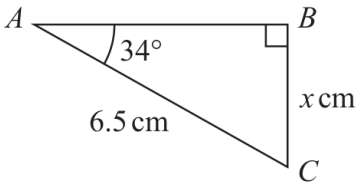


Diagram **NOT** accurately drawn

Work out the value of x
Give your answer correct to one decimal place.

$x =$ .....

Worked Solution 19

Right-triangle trigonometry

MODULAR UNIT 1

3 marks

Sine

$$\sin 34^\circ = x/6.5 \Rightarrow x = 6.5 \sin 34^\circ.$$

Final answer

$$3.6 \text{ cm}$$

Question 20

4MA1-2H Q6

ORIGINAL QUESTION

3 marks

6 Change a speed of w metres per second to a speed in kilometres per hour.
Give your answer in terms of w in its simplest form.

..... kilometres per hour

Worked Solution 20

Convert speed units

MODULAR UNIT 1

3 marks

Convert

$$w \text{ m/s} = w \times 3600/1000 = 3.6w \text{ km/h}.$$

Final answer

$$3.6w \text{ km/h}$$

Question 21
4MA1-2H Q7

ORIGINAL QUESTION
4 marks

7 The diagram shows a 6-sided shape $ABCDEF$

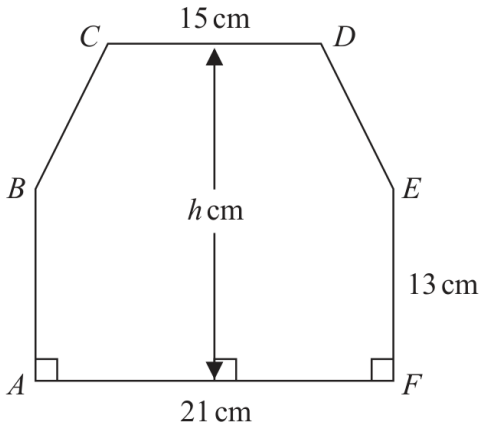


Diagram **NOT** accurately drawn

$AF = 21$ cm $\quad CD = 15$ cm $\quad AB = FE = 13$ cm

The perpendicular height of the shape is h cm
CD is parallel to AF

The area of the shape is $390\,\text{cm}^2$

Work out the value of h

$h =$ .....

Worked Solution 21

Composite area

MODULAR UNIT 1

4 marks

Area equation

$$21(13) + \frac{1}{2}(21 + 15)(h - 13) = 390.$$

Solve

$$273 + 18(h - 13) = 390 \Rightarrow h = 19.5.$$

Final answer

$$19.5 \text{ cm}$$

Question 22

4MA1-2H Q11

ORIGINAL QUESTION

3 marks

11 (i) Factorise $x^2 + 9x - 22$

.....

(2)

(ii) Hence, solve $x^2 + 9x - 22 = 0$

.....

(1)

Worked Solution 22

Factorise, hence solve

MODULAR UNIT 1

3 marks

Factorise

$$x^2 + 9x - 22 = (x - 2)(x + 11).$$

Roots

$$(x - 2)(x + 11) = 0.$$

Final answer

$$(x - 2)(x + 11); \quad x = 2, -11$$

Question 23
4MA1-2H Q14

ORIGINAL QUESTION
4 marks

(b) Solve $\frac{2x+3}{5} + \frac{6x-5}{4} = \frac{163}{100}$

Show clear algebraic working.

$x =$ .....

(4)

Worked Solution 23

Fractional equation

MODULAR UNIT 1

4 marks

Clear the denominators

$$20(2x+3)+25(6x-5)=163.$$

Solve

$$190x=228 \Rightarrow x=1.2.$$

Final answer

$$x=1.2$$

Question 24
4MA1-2H Q16

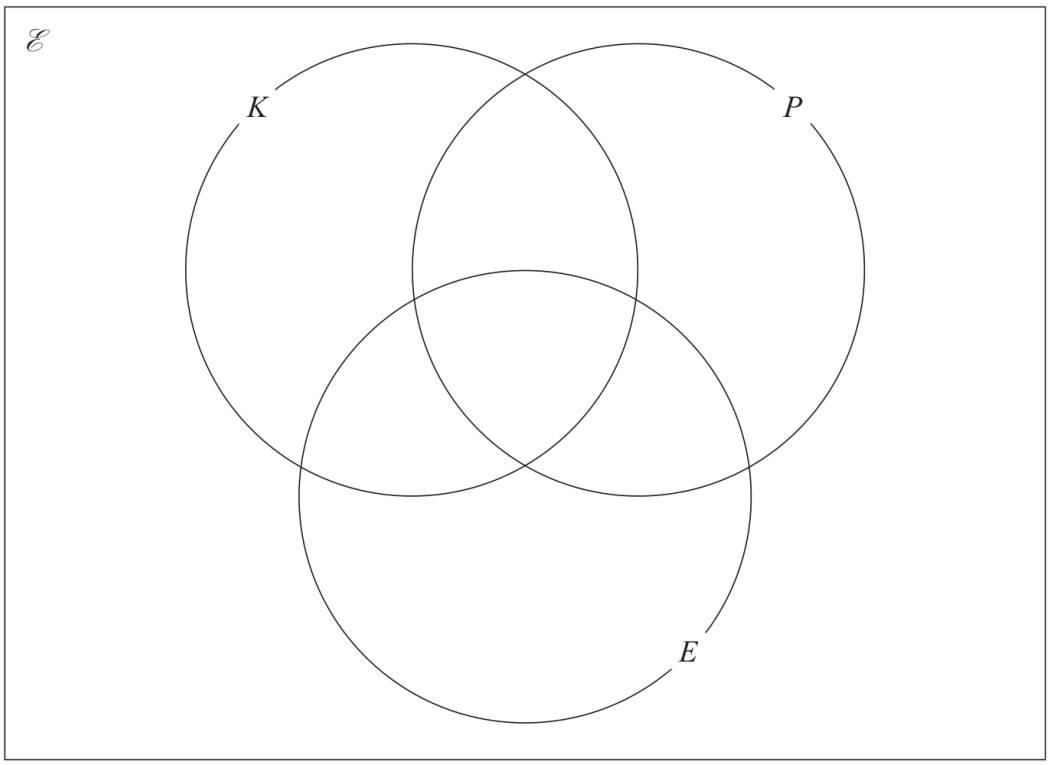
ORIGINAL QUESTION
7 marks

16 60 art students were asked if they would like to attend workshops for knitting (K), for photography (P) or for embroidery (E)

Of these students

9 chose knitting, photography and embroidery
17 chose knitting and photography
16 chose photography and embroidery
20 chose knitting and embroidery
28 chose photography
39 chose embroidery
2 chose none of the workshops

(a) Using this information, complete the Venn diagram to show the numbers of students in each subset.



(3)

Question 24 (continued)

4MA1-2H Q16

ORIGINAL QUESTION

7 marks

One of the students is chosen at random.

Given that this student chose photography,

(b) find the probability that this student also chose knitting.

.....

(2)

(c) Find $n(P \cap K')$

.....

(1)

(d) Find $n([P \cup E] \cap K)$

.....

(1)

Worked Solution 24

Three-set Venn diagram

MODULAR UNIT 1

7 marks

Regions

$$KPE = 9,\ KP = 8,\ PE = 7,\ KE = 11,\ P = 4,\ E = 12,\ K = 7,\ \text{outside} = 2.$$

Conditional probability

$$P(K \mid P) = 17/28.$$

Counts

$$n(P \cap K') = 4 + 7 = 11; \quad n((P \cup E) \cap K) = 8 + 11 + 9 = 28.$$

Final answer

$$\frac{17}{28}; \quad 11; \quad 28$$

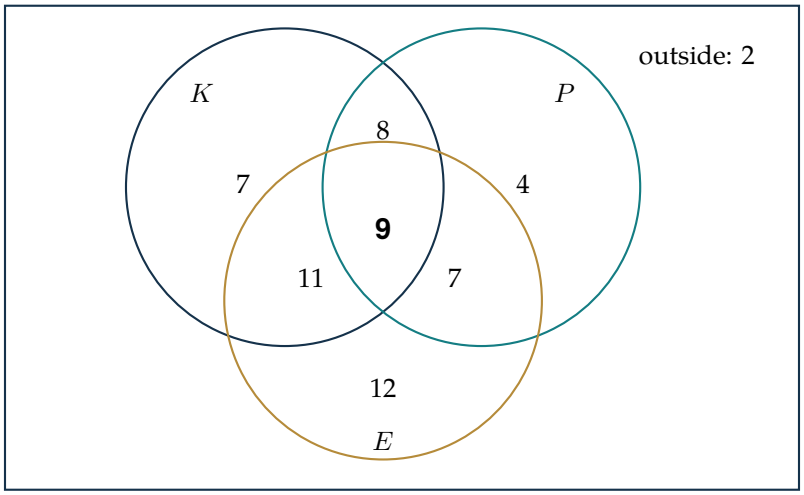
Completed diagram 24

Three-set Venn diagram

MODULAR UNIT 1

7 marks

Completed solution diagram: Completed three-set Venn diagram



Question 25
4MA1-2H Q18

ORIGINAL QUESTION
2 marks

18 The straight line **P** has equation $5y + 2x = 7$

Find the gradient of a straight line that is perpendicular to **P**

.....

Worked Solution 25

Perpendicular gradient

MODULAR UNIT 1
2 marks

Gradient

$$5y + 2x = 7 \Rightarrow m = -2/5; \quad m_{\perp} = 5/2.$$

Final answer

$$\frac{5}{2}$$

Question 26
4MA1-2H Q19

ORIGINAL QUESTION
3 marks

19 $G = \dfrac{c}{2f - 3h}$

$c = 8$ correct to the nearest whole number
$f = 6.62$ correct to 2 decimal places
$h = 1.2$ correct to 1 decimal place

Work out the lower bound for the value of G
Give your answer correct to 3 decimal places.
Show your working clearly.

.....

Worked Solution 26

Lower bound

MODULAR UNIT 1

3 marks

Bounds

$$c_L = 7.5,\ f_U = 6.625,\ h_L = 1.15.$$

Substitute

$$G_L = \frac{7.5}{2(6.625) - 3(1.15)} = 0.765306\ldots$$

Final answer

$$0.765$$

Question 27

4MA1-2H Q23

ORIGINAL QUESTION

3 marks

23 Simplify $\dfrac{30 \times 25^{2x+7}}{\sqrt{180} \times \left(\sqrt{5}\right)^{4x+9}}$

Give your answer in the form 5^w where w is an expression in terms of x
Show each stage of your working clearly.

.....

Worked Solution 27

Surds and index laws

MODULAR UNIT 1

3 marks

Rewrite in base 5

$$30 = 6 \cdot 5,\ 25^{2x+7} = 5^{4x+14},\ \sqrt{180} = 6\sqrt{5}.$$

Combine

$$\frac{30 \cdot 25^{2x+7}}{\sqrt{180}(\sqrt{5})^{4x+9}} = 5^{2x+10}.$$

Final answer

$$5^{2x+10}$$