



DELEGATE BOOKLET 1 TASKS

SECTION A 4MA1

Task 1

SAMs Paper 2F Q23 / Paper 4H Q8

Student attempt A

8. Kwo invests HK\$40 000 for 3 years at 2% per year compound interest.
Work out the value of the investment at the end of 3 years.

$$40000 \times 3 = 120000$$

$$2\% \times 120000 = 2400$$

$$40,000 + 2400 = 42,400$$

HK\$.....42,400.....

(Total for Question 8 is 3 marks)

Student attempt B

8. Kwo invests HK\$40 000 for 3 years at 2% per year compound interest.
Work out the value of the investment at the end of 3 years.

$$40000 \times 1.2 \times 1.2 \times 1.2 = 69120$$

HK\$.....69120.....

(Total for Question 8 is 3 marks)

Student attempt C



Pearson Edexcel

8. Kwo invests HK\$40 000 for 3 years at 2% per year compound interest.
Work out the value of the investment at the end of 3 years.

$$\frac{40000}{100} = ? \times 2 = 1 \text{ year} \quad 800$$

↓

$$40000 + 800$$

↓

$$\frac{40800}{100} \times 2 = 2 \text{ year} = 816$$

↓

$$\frac{41616}{100} \times 2 = 832.32$$

HK\$.....832.32

(Total for Question 8 is 3 marks)



Task 2

SAMs Paper 1F Q21a / Paper 3H Q6a

Student attempt A/B/C

5. (a) Factorise fully $18e^3f + 45e^2f^4$

$$6e^2f \times 3e$$

$$3e^2f$$

$$3ef(6e^2 + 15ef^3)$$

$$3ef(6e^2 + 15ef^3)$$

(2)

5. (a) Factorise fully $18e^3f + 45e^2f^4$

$$3e^2f(6e + 15f^3)$$

$$3e^2f(6e + 15f^3)$$

5. (a) Factorise fully $18e^3f + 45e^2f^4$

$$9e^2f(2e + 5f^3)$$

$$9e^2f(2e + 5f^3)$$

(2)

Task 3**SAMs Paper 1F q21b / Paper 3H q6b**

Student attempt A

(b) Solve $x^2 - 4x - 12 = 0$
Show clear algebraic working.

$$x^2 - 4x = 0 + 12$$
$$x^2 - x = \frac{12}{4}$$
$$x - x = \sqrt{\frac{12}{4}}$$
$$x = \sqrt{\frac{12}{4}}$$

$\sqrt{\frac{12}{4}}$
.....
(3)

(Total for Question 5 is 5 marks)

Student attempt B



Pearson Edexcel

- (b) Solve $x^2 - 4x - 12 = 0$
Show clear algebraic working.
 $a = 1$ $b = -4$ $c = -12$

$$\frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$
$$\frac{4 \pm \sqrt{16 - 4(1)(-12)}}{2}$$
$$\frac{4 \pm \sqrt{-32}}{2}$$

(3)

(Total for Question 5 is 5 marks)

Student attempt C

- (b) Solve $x^2 - 4x - 12 = 0$
Show clear algebraic working.

$$(x - 6)(x + 2)$$

$$(x - 6)(x + 2) \dots \dots \dots$$

(3)

(Total for Question 5 is 5 marks)



Task 4

SAMs Paper 1F q25 / Paper 3H q10

Student attempt A

$AB = 7.6$ cm and $AC = 9.5$ cm.

Calculate the area of the shape.

Give your answer correct to 3 significant figures.

$$\begin{aligned} a^2 + b^2 &= c^2 \\ 7.6^2 + b^2 &= 9.5^2 \\ 57.76 + b^2 &= 90.25 \\ b^2 &= 90.25 - 57.76 \\ b^2 &= 32.49 \\ b &= \sqrt{32.49} \\ b &= 5.7 \end{aligned}$$

12.8.....cm²

(Total for Question 10 is 5 marks)





Student attempt B

Give your answer correct to 3 significant figures.

Pythag. equ. $\rightarrow a^2 = b^2 + c^2$

$$c^2 - b^2 = a^2$$
$$\sqrt{c^2 - b^2} = a$$
$$\sqrt{9.5^2 - 7.6^2} = a$$
$$a = 5.7 \text{ cm}$$
$$BC = 5.7 \text{ cm}$$
$$\frac{5.7}{2} = 2.85$$
$$\pi r^2$$
$$\pi \times (2.85)^2 = 25.517586$$

Area of Semi circle = 25.517586

$$\text{Area of triangle} = \frac{5.7 \times 7.6}{2} = 21.66$$
$$21.66 + 25.517586$$

47.2.....cm²

(Total for Question 10 is 5 marks)



Student attempt C

$AB = 7.6$ cm and $AC = 9.5$ cm.

Calculate the area of the shape.

Give your answer correct to 3 significant figures.

$$9.5^2 - 7.6^2 = 12$$

$$90.25 - 57.76 = 32.49$$

$$\sqrt{32.49} = \boxed{5.7}$$

$$\begin{aligned} \text{Area of circle} &= \pi r^2 \\ &= 5.7^2 \pi = 102.0703953 \\ &\approx \boxed{102} \end{aligned}$$

$$\begin{aligned} \text{Area of triangle} &= \frac{1}{2} b \times h \\ &= \frac{1}{2} 5.7 \times 9.5 = 27.075 + 56.3 \\ &= 83.375 \approx \boxed{83.4} \end{aligned}$$

$$\begin{aligned} &83.4 + 102 \\ &= 185.4 \end{aligned}$$

(Total for Question 10 is 5 marks)

Task 5

SAMs Paper 4H q24

Student attempt A

10. Show that $\frac{\sqrt{12}-1}{2-\sqrt{3}}$ can be written as $4+3\sqrt{3}$

Show your working clearly.

$$\begin{aligned}\frac{\sqrt{12}-1}{2-\sqrt{3}} &= 4+3\sqrt{3} \\ \sqrt{12}-1 &= 4+3\sqrt{3} \times (2-\sqrt{3}) \\ \sqrt{12}-1 &= 8-4\sqrt{3}+6\sqrt{3}-9 \\ \sqrt{12} &= -1+2\sqrt{3} \\ 2\sqrt{3} &= -1+2\sqrt{3} \\ 2\sqrt{3} &= 2\sqrt{3} \\ \text{LHS side} &= \text{right side} \\ \therefore \frac{\sqrt{12}-1}{2-\sqrt{3}} &\text{ can be written as } 4+3\sqrt{3}\end{aligned}$$

$$\begin{aligned}\frac{\sqrt{12}-1}{2-\sqrt{3}} &= \frac{2\sqrt{3}-1}{2-\sqrt{3}} \times \frac{2+\sqrt{3}}{2+\sqrt{3}} \\ &= \frac{6-1}{2-1} = \frac{5}{1} = 5 \\ &= \frac{\sqrt{4} \times 3 - 1}{2-\sqrt{3}} \\ &= \frac{2\sqrt{3}-1}{2-\sqrt{3}} \times \frac{2+\sqrt{3}}{2+\sqrt{3}} \\ &= \frac{4\sqrt{3}-2-2\sqrt{3}+1}{2-1} = \frac{2\sqrt{3}-1}{1} = 2\sqrt{3}-1\end{aligned}$$

(Total for Question 10 is 4 marks)

Student attempt B

10. Show that $\frac{\sqrt{12}-1}{2-\sqrt{3}}$ can be written as $4+3\sqrt{3}$

Show your working clearly.

$$\begin{aligned} & \frac{\sqrt{12}-1}{2-\sqrt{3}} \\ &= \frac{\sqrt{12}-1 \times (2+\sqrt{3})}{2-\sqrt{3} \times (2+\sqrt{3})} \\ &= \frac{2\sqrt{12} + \sqrt{36} - 2 - \sqrt{3}}{2^2 - 3} \end{aligned}$$

$$\begin{aligned} & \rightarrow \frac{2\sqrt{12} + \sqrt{36} - 2 + \sqrt{3}}{1} \\ &= 2\sqrt{4 \times 3} + \sqrt{12} \\ &= 2\sqrt{4 \times 3} + 6 - 2 - \sqrt{3} \\ &= 4\sqrt{3} - \sqrt{3} + 4 \\ &= 3\sqrt{3} + 4 \\ &= 4 + 3\sqrt{3} // \end{aligned}$$

(Total for Question 10 is 4 marks)



Student attempt C

10. Show that $\frac{\sqrt{12}-1}{2-\sqrt{3}}$ can be written as $4+3\sqrt{3}$

Show your working clearly.

$$\frac{\sqrt{12}-1}{2-\sqrt{3}} = \frac{\sqrt{4 \times 3}-1}{2-\sqrt{3}} = \frac{2\sqrt{3}-1}{2-\sqrt{3}} \times \frac{2+\sqrt{3}}{2+\sqrt{3}} = \frac{3\sqrt{3}}{4-\sqrt{3}}$$

$$~~(2\sqrt{3}-1)(2+\sqrt{3}) = 4\sqrt{3}-2+2\sqrt{3}-\sqrt{3}~~$$

$$= \underline{3\sqrt{3}} \quad (2\sqrt{3}-1)(2+\sqrt{3})$$

$$(2-\sqrt{3})(2+\sqrt{3})$$

$$= 4\sqrt{3}-2+6-\sqrt{3}$$

$$= 4 - \cancel{2\sqrt{3}} + \cancel{2\sqrt{3}} - \sqrt{3}$$

$$= 4 - \sqrt{3}$$

(Total for Question 10 is 4 marks)

Task 6**SAMs Paper 3H q23**

Student attempt A



1. The 4th term of an arithmetic series is 17.
The 10th term of the same arithmetic series is 35.

Find the sum of the first 50 terms of this arithmetic series.

$$S_n = \frac{n}{2} [2a + (n-1)d]$$

$$S_{50} = 25 [2a + 49d]$$

$$S_n = a + (n-1)d$$

$$S_4 = a + 3d$$

$$17 = a + 3d$$

$$S_5 = a + 4d$$

$$35 = a + 4d$$

$$\begin{array}{r} 35 = a + 4d \\ - 17 = a + 3d \\ \hline 18 = d \end{array}$$

$$18 = d$$

$$d = 18$$

$$\begin{array}{r} a = 17 - 3d \\ = 17 - 54 \\ = -37 \end{array}$$

$$\begin{array}{r} S_{50} = 25 [2a + 49d] \\ = 25 [-74 + 882] \\ = 20425 \end{array}$$

(Total for Question 9 is 5 marks)



9. The 4th term of an arithmetic series is 17.
The 10th term of the same arithmetic series is 35.

Find the sum of the first 50 terms of this arithmetic series.

$$a_4 = 17 \quad a_{10} = 35$$

$$S_n = \frac{n}{2} [2a + (n-1)d]$$

$$S_n = 25 \left[17 + (49) \times \frac{17}{6} \right]$$

$$= \underline{\underline{3895.83}} \quad \approx \quad \underline{\underline{3900}}$$

$$\begin{aligned} n &= 50 \\ d &= \frac{35-17}{6} = \frac{17}{6} \\ a &= 8.5 \end{aligned}$$

(Total for Question 9 is 5 marks)



Student attempt C

9. The 4th term of an arithmetic series is 17.
The 10th term of the same arithmetic series is 35.
Find the sum of the first 50 terms of this arithmetic series.

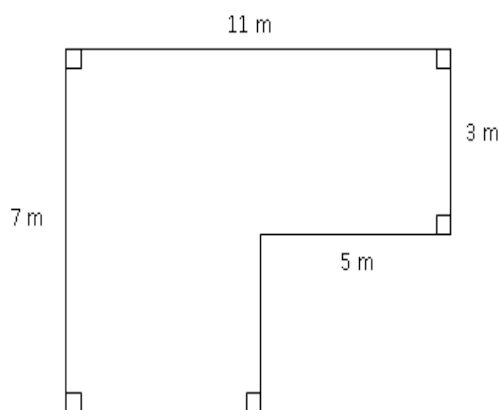
$$\begin{aligned}
 & \text{4th term } = 17 \\
 & \text{10th term } = 35 \quad 35 - 17 = 18 \div 6 = 3 \\
 & a = 5, d = 3, n = 50 \\
 & S = \frac{n}{2} \times [2a + (n-1)d] \\
 & S = \frac{50}{2} \times [2 \times 5 + (50-1) \times 3] \\
 & S = 25 \times [10 + 147] \\
 & S = 3925
 \end{aligned}$$

(Total for Question 9 is 5 marks)

Task 7

Construct a basic mark scheme for this question – worth 5 marks.

PROBLEM SOLVING



The diagram shows the floor plan of a room in Kate's house.

Kate is going to cover the floor with tiles. She is going to buy some packs of tiles.

The tiles in each pack of tiles cover 2 m^2 of floor. Each pack of tiles costs £24.80

Work out how much it will cost Kate to buy the packs of tiles she needs.

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Mark Scheme
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SECTION B 4MB1

Task 8

SAMs Paper 1 Q26

Student Attempt A



Pearson Edexcel

26 (a) Use the factor theorem to show that $(2x + 3)$ is a factor of $2x^3 - 3x^2 - 17x - 12$

$$\begin{array}{r} x^2 \quad - \\ (2x+3) \overline{) 2x^3 - 3x^2 - 17x - 12} \\ \underline{2x^3 + 3x^2} \\ -17x - 12 \end{array}$$

$$\begin{array}{r} 2x+3 \\ x \quad - \frac{3}{2} \\ \hline 2x+3 \\ \hline x - \frac{3}{2} \end{array}$$

$$2x^3 - 3x^2 - 17x - 12 = 0$$

$$2\left(-\frac{3}{2}\right)^3 - 3\left(-\frac{3}{2}\right)^2 - 17\left(-\frac{3}{2}\right) - 12 = 0$$

$$2\left(-\frac{27}{8}\right) - 3\left(\frac{9}{4}\right) + \frac{51}{2} - 12 = 0$$

$$\therefore -\frac{27}{4} - \frac{27}{4} + \frac{51}{2} - 12 = 0$$

(b) Hence, factorise completely $2x^3 - 3x^2 - 17x - 12$

$$\begin{array}{r|rrrr} 2 & -3 & -17 & -12 & \\ & -3 & 9 & 12 & \\ \hline 2 & -6 & -8 & 0 & \end{array}$$

$$\begin{array}{r|rr} 2x & 2x & -8x \\ x & -4x & 2x \\ \hline 2x^2 & -8x & -6x \end{array}$$

$$2(x+1)(2x+3)(x-4) = 0$$

(4)

$$2x^3 - 3x^2 - 17x - 12 = (2x+3)(2x^2 - 6x - 8) = 0$$

$$(2x+3)(2x+2)(x-4) = 0$$

$$(2x+3)(x-4)2(x+1) = 0$$

(Total for Question 26 is 6 marks)

26 (a) Use the factor theorem to show that $(2x+3)$ is a factor of $2x^3 - 3x^2 - 17x - 12$

$$\begin{array}{r}
 (2x+3) \overline{) 2x^3 - 3x^2 - 17x - 12} \\
 \underline{-(2x^3 + 3x^2)} \\
 -6x^2 - 17x \\
 \underline{-(6x^2 + 9x)} \\
 -8x - 12 \\
 \underline{-(8x + 12)} \\
 0
 \end{array}$$

(b) Hence, factorise completely $2x^3 - 3x^2 - 17x - 12$

$$\begin{aligned}
 & 2x^3 - 3x^2 - 17x - 12 \\
 &= (x^2 - 3x - 4)(2x + 3) \\
 &= (x - 4)(x + 1)(2x + 3)
 \end{aligned}$$

Student attempt C

26 (a) Use the factor theorem to show that $(2x+3)$ is a factor of $2x^3 - 3x^2 - 17x - 12$

$$\begin{aligned}
 x &= -\frac{3}{2} \\
 f\left(-\frac{3}{2}\right) &= 2\left(-\frac{3}{2}\right)^3 - 3\left(-\frac{3}{2}\right)^2 - 17\left(-\frac{3}{2}\right) - 12 \\
 &= 0
 \end{aligned}$$

(2)

(b) Hence, factorise completely $2x^3 - 3x^2 - 17x - 12$

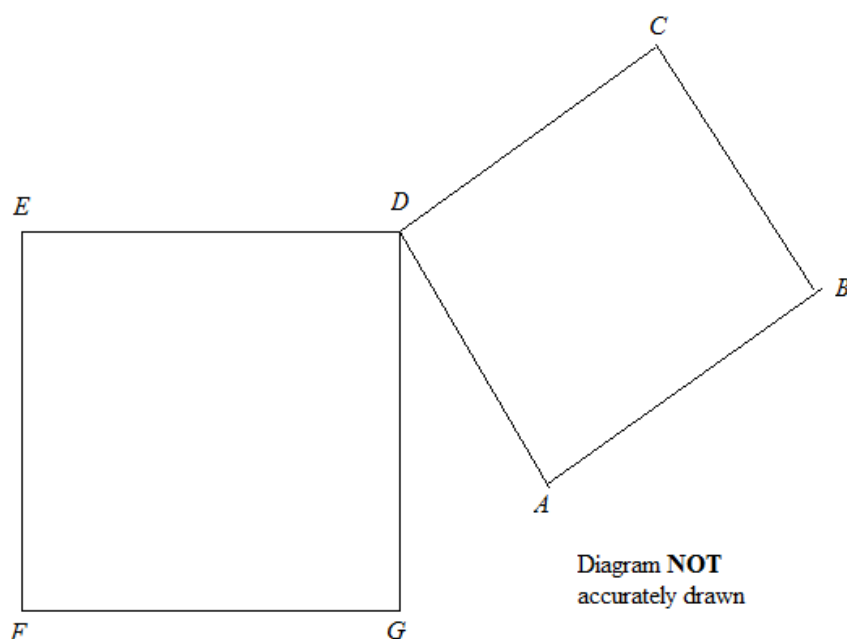
$$\begin{array}{r}
 2x+3 \overline{) 2x^3 - 3x^2 - 17x - 12} \\
 \underline{2x^3 + 3x^2} \\
 -6x^2 - 17x - 12 \\
 \underline{-(6x^2 + 9x)} \\
 -8x - 12 \\
 \underline{-(8x + 12)} \\
 0
 \end{array}$$

$$\begin{aligned}
 & (x^2 - 3x - 4) \\
 &= (x - 4)(x + 1)
 \end{aligned}$$

Task 10

MATHEMATICAL REASONING

Construct a basic mark scheme for this question – worth 4 marks.



$ABCD$ and $DEFG$ are squares that are not identical.

Prove that $AE = CG$

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Mark Scheme
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