

DELEGATE BOOKLET TASKS

16IOAM09

SAMs Paper 2F Q23 / Paper 4H Q8

Kwon 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.

AO1 Numbers and Algebra

1.6 Percentages **G** use compound interest and depreciation.

Marking

M1 $0.02 \times 40\,000$ (=800) or $1.02 \times 40\,000$ (=40800) or 2400

M1 for method to find interest for year 2 **and** year 3

“40800” $\times 0.02$ (=816) and “41616” $\times 0.02$ (=832.32) **OR** 2448.32

(**M2** for $40\,000 \times 1.02^3$)

A1 42448.32

Student attempt

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.

$$40000 \times 3 = 120000$$

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

$$40000 + 2400 = 42400$$

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

(Total for Question 8 is 3 marks)

Student attempt

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

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.

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

$$\Downarrow$$

$$40000 + 800$$

$$\Downarrow$$

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

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

HK\$.....832.32

(Total for Question 8 is 3 marks)

SAMs Paper 1F q21b / Paper 3H q6b

Solve $x^2 - 4x - 12 = 0$

Show clear algebraic working.

(3)

A01 Numbers and Algebra

2.7 Quadratic equations **A** solve quadratic equations by factorisation (limited to $x^2 + bx + c = 0$)

Marking

M1 $(x \pm 6)(x \pm 2)$ or correct substitution into quadratic formula (allow one sign error)

M1 $(x - 6)(x + 2)$ or $\frac{4 \pm \sqrt{64}}{2}$

A1 6, -2 dependent on at least M1

Student attempt

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

$$\begin{aligned} x^2 - 4x &= 0 + 12 \\ x^2 - x &= \frac{12}{4} \\ x - x &= \sqrt{\frac{12}{4}} \\ x &= \sqrt{\frac{12}{4}} \end{aligned}$$

$$\sqrt{\frac{12}{4}}$$

(3)

(Total for Question 5 is 5 marks)

Student attempt

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

$$a=1 \quad b=-4 \quad c=-12$$

$$\frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

$$\frac{4 \pm \sqrt{16 - 4(1)(-12)}}{2}$$

$$\frac{4 \pm \sqrt{-32}}{2}$$

(3)

(Total for Question 5 is 5 marks)

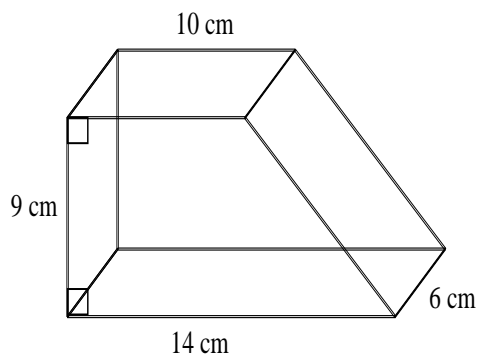
Student attempt

- (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)

SAMs Paper 2F q18 / Paper 4H q3

The diagram shows a solid prism.
 The cross section of the prism is a trapezium.
 The prism is made from wood with density 0.7 g/cm^3
 Work out the mass of the prism.

(4)

AO2 Shape, space and measure**4.4 Measures G** use compound measure such as speed, *density* and pressure**Marking**

- M1** for area of cross section $0.5 \times (10 + 14) \times 9$ oe (= 108)
M1 volume of prism (dep on previous M1) "108" $\times 6$ (= 648)
M1 "648" $\times 0.7$ (independent)
A1 453.6 (accept 454)

Student attempt

Work out the mass of the prism.

$$\text{volume} = \text{area of cross section} \times \text{length}$$

$$\text{mass} = d \times v$$

$$d = 0.7$$

$$v = 90 + \frac{45}{2}$$

$$90 + 22.5$$

$$= 112.5 \times 14 = \underline{\underline{1575 \text{ cm}^3}} \times \underline{\underline{0.7 \text{ g/cm}^3}}$$

1102.5

.....g

(Total for Question 4 is 4 marks)

Student attempt

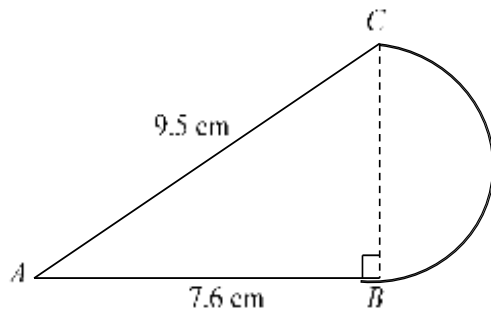
$$\frac{1}{2}(a+b)h = 108$$
$$0.5(10+14)9$$

density = $\frac{\text{mass}}{\text{volume}}$

108 ÷ 0.7 g/cm³

154.9

(Total for Question 4 is 4 marks)

SAMs Paper 1F q25 / Paper 3H q10

The diagram shows a shape made from triangle ABC and a semicircle with diameter BC . Triangle ABC is right-angled at B . $AB = 7.6$ cm and $AC = 9.5$ cm. Calculate the area of the shape. Give your answer correct to 3 significant figures.

AO2 Shape, space and measure

4.9 mensuration of 2D shapes **E** ...find perimeters and areas of semicircles.

Marking

M1 $\sqrt{9.5^2 - 7.6^2}$ oe

A1 (BC =) 5.7

M1 dep on first M1 for $0.5 \times 7.6 \times '5.7'$ or 21.6(6) or 21.7 oe

M1 $0.5 \times \pi \times ('5.7' \div 2)$ or 12.7(587...) or 12.8

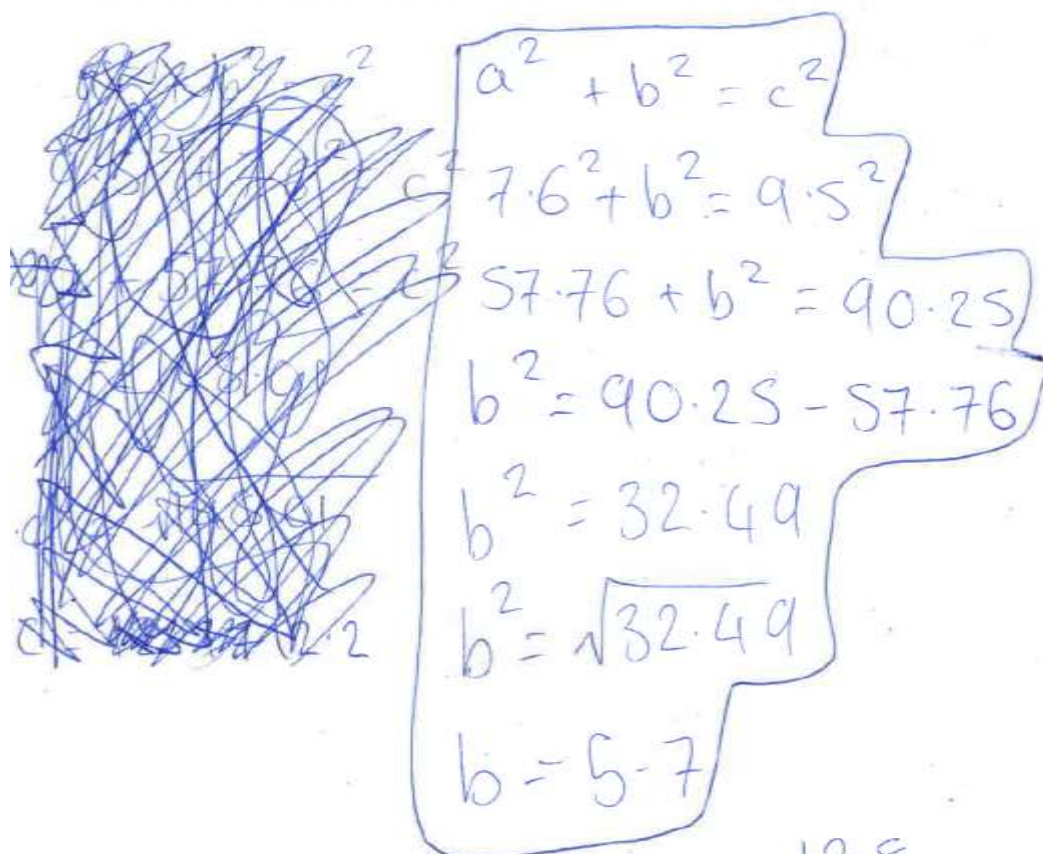
A1 34.4

Student attempt

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

Calculate the area of the shape.

Give your answer correct to 3 significant figures.



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

12.8.....cm²

(Total for Question 10 is 5 marks)

Student attempt

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

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

$$21.66 + 25.517586$$

47.2cm²

(Total for Question 10 is 5 marks)

Student attempt

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

Calculate the area of the shape.

Give your answer correct to 3 significant figures.

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

$$90.25 - 57.76 = 32.49$$

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

$$\begin{aligned} \text{Area of circle} &= \pi r^2 \\ &= 5.7^2 \pi = 56.25674504 \end{aligned}$$

$$\text{or } \boxed{56.3}$$

Area of triangle $\frac{1}{2} b \times h$

$$= \frac{1}{2} 5.7 \times 9.5 = 27.075 + 56.3$$

$$\begin{array}{r} 11 \\ 27.075 + 56.3 \\ \hline 83.375 \end{array} \quad \boxed{83.4}$$

$$\boxed{83.4} \text{ cm}^2$$

(Total for Question 10 is 5 marks)

SAMs Paper 4H q24

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

Show your working clearly.

AO1 Numbers and the number system

1.4 Powers and roots **B** manipulating surds, including rationalising a denominator

Marking

M1 method to rationalise $\frac{(\sqrt{12}-1)(2+\sqrt{3})}{(2-\sqrt{3})(2+\sqrt{3})}$

M1 correct expansion of brackets $\frac{2\sqrt{12}-2+\sqrt{12}\sqrt{3}-\sqrt{3}}{4-3}$

B1 $\sqrt{12} = 2\sqrt{3}$ (may be seen before expansion)

A1 answer from fully correct working with all steps seen

Student attempt

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

Show your working clearly.

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

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

$$\sqrt{12}-1 = 8-4\sqrt{3}+6\sqrt{3}-9$$

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

$$2\sqrt{3} = -1+1+2\sqrt{3}$$

$$2\sqrt{3} = 2\sqrt{3}$$

Left side = right side

$$\therefore \frac{\sqrt{12}-1}{2-\sqrt{3}} \text{ can be written as } 4+3\sqrt{3}$$

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

(Total for Question 10 is 4 marks)

Student attempt

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

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

Show your working clearly.

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

$$\begin{aligned} & \frac{(2\sqrt{3}-1)(2+\sqrt{3})}{(2-\sqrt{3})(2+\sqrt{3})} \\ & = \frac{4\sqrt{3}-2+6-\sqrt{3}}{4-3} \end{aligned}$$

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

$$\begin{aligned} & = 4 - 2\sqrt{3} + 2\sqrt{3} - \sqrt{3} \\ & = 4 - \sqrt{3} \end{aligned}$$

(Total for Question 10 is 4 marks)

1MA0 June 2014 Paper 2H Q21b

Prove algebraically that

$(2n+1)^2 - (2n+1)$ is an even number for all positive integer values of n .

AO1 Number and algebra**2.2** Algebraic manipulation **E** use algebra to support and construct proofs**Marking****M1** for 3 out of 4 terms correct in the expansion of $(2n + 1)^2$ **or** $(2n + 1)((2n+1)^2 - 1)$ **A1** $4n^2 + 2n$ or equivalent expression in factorised form**A1** for convincing statement using $2n(2n + 1)$ **or** $2(2n^2 + n)$ **or** $4n^2 + 2n$

Student attempt

i. Prove algebraically that

$(2n+1)^2 - (2n+1)$ is an even number

for all positive integer values of n .

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

$$\begin{aligned}4n^2 + 4n + 1 - (2n + 1) \\ 4n^2 + 4n + 1 - 2n - 1 \\ = \underline{4n^2 + 2n}\end{aligned}$$

any integer will give a positive value
if multiplied by 4 or 2
therefore $4n^2 + 2n$ will always give an
even number if n is a positive integer

(Total for Question 6 is 5 marks)

Student attempt

6. Prove algebraically that

$$(2n+1)^2 - (2n+1) \text{ is an even number}$$

for all positive integer values of n . $2n+1 = \text{always an odd number}$

$$\cancel{(2n+1)^2 = 4n^2 + 4n + 1} \quad (2n+1)^2 = \text{always an odd number}$$

$$\cancel{4n^2 + 4n + 1 =}$$

$$n > 0$$

$$\therefore (2n+1)^2 - (2n+1)$$

$$= 4n^2 + 4n + 1 - 2n - 1$$

$$= 4n^2 + 2n \rightarrow \text{always an even number}$$

when $n=1$

$$(2 \times 1 + 1)^2 - (2 \times 1 + 1)$$

$$= (3)^2 - 3$$

$$= 9 - 3$$

$$= 6 \rightarrow \text{even}$$

when $n=2$

$$(2 \times 2 + 1)^2 - (2 \times 2 + 1)$$

$$= (5)^2 - 5$$

$$= 25 - 5$$

$$= 20 \rightarrow \text{even}$$

(Total for Question 6 is 5 marks)

Student attempt

6. Prove algebraically that

$(2n+1)^2 - (2n+1)$ is an even number

for all positive integer values of n .

even number $s = 2n(n+1)$

$$\hookrightarrow (2n+1)(2n+1) = 4n^2 + 4n + 1$$

$$4n^2 + 4n + 1 - (2n + 1)$$

$$= 4n^2 + 2n$$

$$\text{is } \underline{\underline{2n(n+1)}}$$

(Total for Question 6 is 5 marks)

SAMs Paper 3H q23

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.

(5)

3.1 Sequences	A Understand and use common difference (d) and first term (a) in an arithmetic sequence
	B Know and use n th term $= a + (n - 1)d$
	C Find the sum of the first n terms of an arithmetic series (s_n)

Marking
M1 for $a + 3d = 17$ and $a + 9d = 35$ or $35 - 17 = 6d$ A1 $d = 3$ A1 $a = 8$ (ft from $d = 3$) M1 for $50/2(2 \times '8' + (50 - 1) \times '3')$ oe A1 4075

Student attempt

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.

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

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

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

$$S_4 = a + 3d$$

$$17 = a + 3d$$

$$S_5 = a + 4d$$

$$35 = a + 4d$$

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

$$18 = d$$

$$d = 3$$

$$\begin{array}{r} a = 17 - 9 \\ = 8 \end{array}$$

$$\begin{array}{r} S_{50} = 25 [16 + 147] \\ = 4075 \end{array}$$

(Total for Question 9 is 5 marks)

Student attempt

$$\begin{array}{cccccccccccc}
 17\frac{1}{2} & 34\frac{1}{3} & 85 & -17\frac{1}{6} & & & & & & & & \\
 n_1 & n_2 & n_3 & n_4 & n_5 & n_6 & n_7 & n_8 & n_9 & n_{10} & & \\
 \swarrow & \nwarrow & \swarrow & \nwarrow & \swarrow & \nwarrow & \swarrow & \nwarrow & \swarrow & \nwarrow & &
 \end{array}$$

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.

$$n_4 = 17 \quad n_{10} = 35$$

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

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

$$= \underline{\underline{3895.83}}$$

$$\approx \underline{\underline{3900}}$$

$$\begin{aligned}
 n &= 50 \\
 d &= \frac{35-17}{10-4} = \frac{17}{6} \\
 a &= 8.5
 \end{aligned}$$

(Total for Question 9 is 5 marks)