



**DELEGATE BOOKLET 2**  
**Questions and Mark Schemes**

## **SECTION A                      4MA1**

### **Task 1**

#### **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.

(3)

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#### **A01 Numbers and Algebra**

**1.6** Percentages

**G** use compound interest and depreciation.

#### **Mark Scheme**

- 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

## **Task 2**

### **SAMs Paper 1F Q21a / Paper 3H Q6a**

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

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#### **A01 Numbers and Algebra**

**2.2** Algebraic manipulation   **B** Take out common factors

Mark Scheme	
<b>M1</b>	Any correct partially factorised expression
<b>A1</b>	for $9e^2f(2e + 5f^3)$

**Task 3**

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

(b) Solve  $x^2 - 4x - 12 = 0$

Show clear algebraic working.

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**A01 Numbers and Algebra**

**2.7 Quadratic equations**

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

**Mark Scheme**

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

**M1** their  $(x \pm 6)(x \pm 2) = 0 \Rightarrow x = \pm 6, \pm 2$  or  $\frac{4 \pm \sqrt{64}}{2}$

**A1** 6, -2 dependant on at least M1

### Task 4

#### SAMs Paper 1F q25 / Paper 3H q10

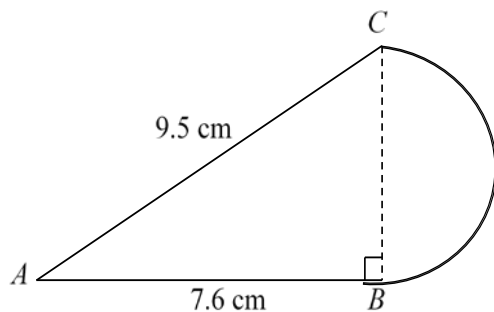
The diagram shows a shape made from a triangle  $ABC$  and a semicircle with diameter  $BC$ .

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.



(5)

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**A02 Shape, space and measure**

**4.9** mensuration of 2D shapes

**E** ...find perimeters and areas of semicircles.

**Marking Scheme**

<b>M1</b>	$\sqrt{9.5^2 - 7.6^2}$ oe
<b>A1</b>	(BC $\Rightarrow$ ) 5.7
<b>M1d</b>	dep on first M1 for $0.5 \times 7.6 \times '5.7'$ <b>or</b> 21.6(6) <b>or</b> 21.7 oe
<b>M1</b>	$0.5 \times \pi \times ('5.7' \div 2)$ <b>or</b> 12.7(587...) <b>or</b> 12.8
<b>A1</b>	34.4

### **Task 5**

#### **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.

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#### **A01 Numbers and the number system**

##### **1.4 Powers and roots**

**B** manipulating surds, including rationalising a denominator

Marking	
<b>M1</b>	method to rationalise $\frac{(\sqrt{12}-1)(2+\sqrt{3})}{(2-\sqrt{3})(2+\sqrt{3})}$
<b>M1</b>	correct expansion of both sets of brackets $\frac{2\sqrt{12}-2+\sqrt{12}\sqrt{3}-\sqrt{3}}{4-3}$
<b>B1</b>	$\sqrt{12} = 2\sqrt{3}$ (may be seen before expansion)
<b>A1</b>	answer from fully correct working with all steps seen

## **Task 6**

### **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.

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

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



## **SECTION B** **4MB1**

### **Task 8**

#### **SAMs Paper Paper 1 Question 26**

- (a) Use the factor theorem to show that  $(2x + 3)$  is a factor of  $2x^3 - 3x^2 - 17x - 12$  (2)
- (b) Hence, factorise completely  $2x^3 - 3x^2 - 17x - 12$  (4)

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Mark Scheme		
Working	Answer	Mark
(a) $2 \times (-1.5)^3 - 3 \times (-1.5)^2 - 17 \times (-1.5) - 12$	$= 0$	M1
		A1
(b) $(2x^3 - 3x^2 - 17x - 12) \div (2x + 3) = x^2 - 3x + k$		M1
$x^2 - 3x - 4$		A1
$(x - 4)(x + 1)$ Solves trinomial quadratic		M1

	$(2x+3)(4-4)(x+1)$	A1
	Total	6 marks

### **Task 9**

### **SAMs paper 1 Question 19**

**19**  $y$  varies directly as the square root of  $x$

$$y = 52 \quad \text{when } x = 169$$

Find the value of  $x$  when  $y = 68$

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Mark	Scheme
M1 A1	$52 = k\sqrt{169}$ oe $k = 4$ (oe) (can be implied)
M1d A1	$x = \left(\frac{68}{4}\right)^2$ $x = 289$
ALT	
{M1 M1d	$52 = k\sqrt{169}$ and $68 = k\sqrt{x}$ $\frac{\sqrt{x}}{\sqrt{169}} = \frac{\sqrt{x}}{13} = \frac{68}{52}$ (oe)
	NB. Just seeing the line above without sight of the first line earns both M marks

A1	$\sqrt{x} = \frac{68}{4}$
A1	$x = 289$

### Question and Mark Scheme for SAMs Paper 2 Question 10

**10** The vertices of triangle  $A$  are the points with coordinates  $(2, 6)$ ,  $(4, 2)$  and  $(6, 2)$ .

- (a) On the grid opposite, draw and label triangle  $A$ . (1)

Triangle  $B$  is the image of triangle  $A$  under a reflection in the line with equation  $y = -1$

- (b) On the grid, draw and label the line with equation  $y = -1$  (1)

- (c) On the grid, draw and label triangle  $B$ . (1)

Triangle  $B$  is transformed to triangle  $C$  by the enlargement with centre  $(0, -2)$  and scale factor  $-\frac{1}{2}$

- (d) On the grid, draw and label triangle  $C$ . (3)

Triangle  $C$  is transformed to triangle  $D$  under the transformation with matrix  $\mathbf{M}$  where

$$\mathbf{M} = \begin{pmatrix} -1 & 0 \\ 0 & 1 \end{pmatrix}$$

- (e) On the grid, draw and label triangle  $D$ . (3)

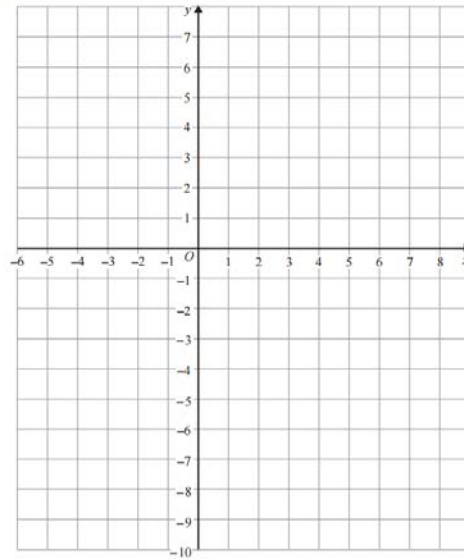
- (f) Describe fully the transformation with matrix  $\mathbf{M}$ . (2)

- (g) Describe fully the **single** transformation that maps triangle  $D$  onto triangle  $A$ . (3)



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Question 10 continued



**Mark Scheme**



Question	Working	Answer	Mark
10(a)	Penalise labelling ONCE only Triangle <i>A</i>	triangle <i>A</i> drawn	B1
10(b)		$y = -1$ drawn	B1
10(c)		triangle <i>B</i> drawn	B1
10(d)	At least two construction lines through (0, -2)		M1
		triangle <i>C</i> drawn	A2 ft (-1 ee)
10(e)			M1
	$\begin{pmatrix} -1 & 0 \\ 0 & 1 \end{pmatrix} \begin{pmatrix} -1 & -2 & -3 \\ 1 & -1 & -1 \end{pmatrix}$	$\begin{pmatrix} 1 & 2 & 3 \\ 1 & -1 & -1 \end{pmatrix}$	A1 ft
		triangle <i>D</i> drawn	A1
10(f)		reflection $x = 0$ or $y$ -axis	B1 B1
10(g)	More than one transformation scores B0, B0, B0		
		enlargement scale factor 2 centre (0, -4)	B1 B1 B1