DUNMAN SECONDARY SCHOOL

CANDIDATE NAME			
CLASS		**INDEX NUMBER**	

PRELIMINARY EXAMINATION 2026
SECONDARY 4 EXPRESS / 5 NORMAL ACADEMIC

MATHEMATICS **4052/02**

Paper 1 18 August 2026

2 hours 15 minutes

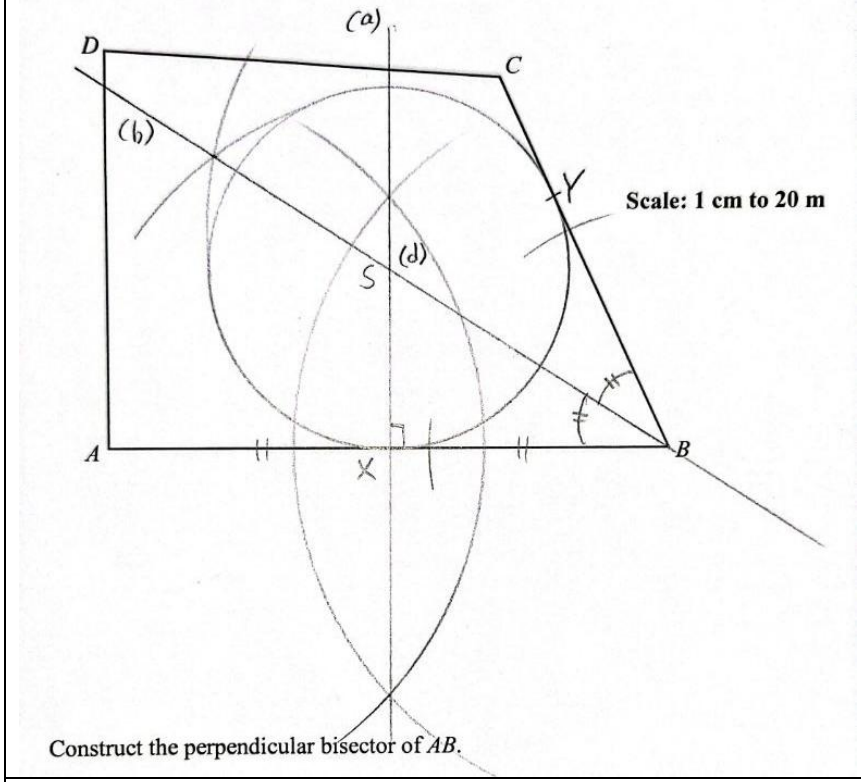
Marking Scheme

(Updated 1 Dec 2022 by HOD/Math aligned to Marking Scheme for Specimen Papers 4049)

Question	Answer	Marks	Partial Marks	Guidance
1(a)	$2-6x$	1	B1	
1(b)	$\left(2a^4\right)^3+(a^2)^6$ $=8a^{12}+a^{12}$	2	M1	
	$=9a^{12}$		A1	
1(c)	$\frac{14x^5y}{9a^2}\div\frac{21xy^3}{6a^4}$ $=\frac{4x^{5-1}a^{4-2}}{9y^{3-1}}$	2	M1	Seen law 2 applied for 1 term.
	$=\frac{4x^4a^2}{9y^2}$		A1	Accept $\frac{4}{9}x^4a^2y^{-2}$ o.e.
2(a)	HCF(252, 280)	2	M1	Can be implied
	= 28		A1	
2(b)	boys = 9, girls = 10	1	B1	
3	$1+6k^2ab-2kb-3ka$ $=-2kb(-3ka+1)-3ka+1$	2	M1	
	$=(1-3ka)(1-2kb)$		A1	
4(a)	$a=\frac{5-\left(4.23\right)^2}{5(-204)}$	2	M1	correct substitution o.e. without rounding to 2 s.f.
	$=0.013$ (2 s.f.)		A1	
4(b)	$5ca=5-b^2$	3	M1	Simplify to one line equation Can be implied
	$b^2=5-5ca$		M1	Make b^2 the subject Can be implied
	$b^2=\pm\sqrt{5-5ca}$		A1	Must have $\pm$

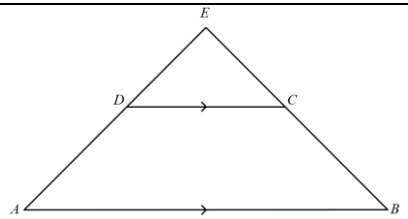
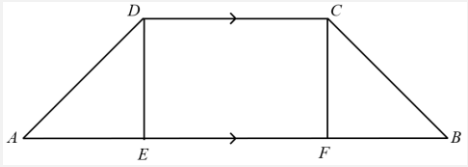
5	$\left(x-\frac{7}{2}\right)^2-\left(\frac{7}{2}\right)^2+4=0$	3	M1	
	$x-\frac{7}{2}=\pm\sqrt{\frac{33}{4}}$		M1	
	$x=6.37$ or $x=0.63$		A1	
6	$\$6545.91=P\left(1+\frac{2.2}{100}\right)^8$	3	M1	
	$P=\$5500.00$		M1	
	$I=\$1045.91$		A1	
7	$=\frac{24-16x+5x-24+12x}{16x}$	3	M2	Or M1 for either common denominator, $16x$ or correct expansion, $24-16x+5x-24+12x$
	$=\frac{1}{16}$		A1	
8(a)	$\frac{122\,000+4000x}{20+x}=5680$	3	M1	Or M1 for attempt to use mean formula
	$122\,000+4000x=5680(20+x)$		M1	Remove denominator
	$x=5$		A1	
8(b)	\$5000	1	B1	
8(c)	Median. \$30 000 salary is an outlier/extreme value that affects the mean but not the median.	1	B1	
9	S.A. of solid $=2\pi(2r)^2+\pi(2r)^2-\pi r^2+2\pi r(4r)+\pi r^2$ $=20\pi r^2$	3	M1	
	$20\pi r^2=2\times(\pi r^2+\pi rl)$		M1	*their* S.A.
	$l=9r$		A1	

10	$\frac{b}{24}=\frac{1}{6}$ $b=4$	4	B1	
	$\frac{x}{15}\times\frac{x-1}{14}=\frac{1}{7}$		M1	
	$x^2-x-30=0$ $x=-5$ (rej.) or $x=6$ No. of girls that did not win a prize = 6		A1	
	No. of girls that won a prize = 9		A1	*Their x* but do not accept if *their x* does not make sense (non-integer or negative values)
11(a)	$k=2700$	2	M1	
	$S=21.6$		A1	
11(b)	$m=64$	1	B1	
12	The increase in area is not (directly) proportional to the height.	2	B1	
	This may mislead the readers that the total investment returns in 2025 is more than 3 times that in 2023.		B1	

13	The diagram shows a park in the shape of a quadrilateral *ABCD*.  Construct the perpendicular bisector of *AB*.	5	5	
	radius $= 3.2 \pm 0.1$ Length of running track $= 2\pi\left(\left(3.2 \pm 0.1\right) \times 20\right) = 390 - 415$ (3s.f.)			
14(a)	Factors of 24	3	B1	
14(b)	$\notin$		B1	
14(c)	8		B1	

15	Disagree	2	B1	
	Not all rational numbers are integers (give an example). Or There are elements in set B that are not in A. For example, $\frac{1}{2} \in B$ but $\frac{1}{2} \notin A$.		B1	
16(a)	$T_5 = (10-1)^2 + 21 = 102$	1	B1	
16(b)	$T_n = (2n-1)^2 + (4n+1)$	3	M2	M1 for $(2n-1)^2$ M1 for $(4n+1)$
	$= 4n^2 + 2$		A1	
16(c)	$T_{k+1} = 4(k+1)^2 + 2$	1	M1	
	$T_{k+1} - T_k = 4k^2 + 8k + 6 - (4k^2 + 2)$ $= 8k + 4$		A1	
16(d)	When $8k + 4 = 10$ $k = 0.75$ Since k is not a positive integer, two consecutive terms of the sequence cannot have a difference of 10.	1	B1	
17	Correct method to get rid of 1 variable using either substitution or elimination.	3	M1	M1 for seen attempt to use the correct method
	$x = 2.5,\ y = -1$		A2	A1 for each correct answer

<table>
<tr><td>18</td><td>
<table>
<tr><th>Statement</th><th>True or False</th><th>Example (if false)</th></tr>
<tr><td>$2n+1$ is always odd.</td><td>True</td><td></td></tr>
<tr><td>The product of two distinct irrational numbers is always irrational</td><td>False</td><td>$\sqrt{2}\times 2\sqrt{2}=4$</td></tr>
<tr><td>$\frac{1}{n}\geq\frac{1}{n^2}$</td><td>False</td><td>$\frac{1}{-1}\ngeq\frac{1}{(-1)^2}$</td></tr>
</table>
</td><td>3</td><td>B3</td><td>B1 for each correct row</td></tr>
<tr><td rowspan="2">19(a)</td><td>Sub $M(a, 3a)$</td><td rowspan="2">2</td><td>M1</td><td></td></tr>
<tr><td>$M(2.4, 7.2)$ or $M\left(2\frac{2}{5}, 7\frac{1}{5}\right)$</td><td>A1</td><td>Accept improper fraction</td></tr>
<tr><td rowspan="3">19(b)</td><td>$K(-3, 0)$</td><td rowspan="3">3</td><td>M1</td><td></td></tr>
<tr><td>$\sqrt{(7.2-0)^2+(2.4-(-3))^2}$</td><td>M1</td><td>Correct formula for length with their M</td></tr>
<tr><td>=9 units</td><td>A1</td><td></td></tr>
<tr><td rowspan="3">20</td><td>$5x=180°$</td><td rowspan="3">3</td><td>M1</td><td></td></tr>
<tr><td>Exterior angle = $72°$</td><td>M1</td><td></td></tr>
<tr><td>no. of sides $=\frac{360}{72}$
$=5$</td><td>A1</td><td></td></tr>
</table>

	 $\angle EDC = \angle DAB$ (corr $\angle s$, $AB//DC$) $\angle ECD = \angle CBA$ (corr $\angle s$, $AB//DC$) $\therefore \Delta EDC$ is an isos. Δ	3	M1	
	hence, $EA = EB$ $(\because \Delta EAB$ is an isos. $\Delta)$ $EA - ED = EB - EC$ $(\because \Delta EDC$ is an isos. $\Delta)$		M1	
	$AD = BC$		A1	
21	Alternatively, $\angle DAE = \angle CBF$ (given) $\angle AED = \angle CFB = 90°$ $DE = CF$ (height of trapezium) $\therefore \Delta ADE \equiv \Delta BCF$ (AAS)  		M2	M1 for any of the correct A, A, S
	$\therefore AD = BC$		A1	
	Alternatively, $\sin \angle DAE = \frac{h}{AD}$ $\sin \angle CBF = \frac{h}{BC}$		M1	
	Since $\angle DAE = \angle CBF$, $\frac{h}{AD} = \frac{h}{BC}$		M1	
	$\therefore AD = BC$		A1	

22(a)	$\angle WFF_N = 70°$ (alt $\angle s$, $WW_N // FF_N$) Or $\angle F_S FP = 84°$ (alt $\angle$, $PN_p // FN_F$) Or $\angle WFF_W = 20°$	2	M1	M1 for any one of the following angles.
	Bearing of W from $F = 290°$		A1	
22(b)	$\angle WPF = 84° - 20°$ $= 64°$ $\angle WFP = 180° - 90° - 64°$ ($\angle s$ sum of Δ) $= 26°$	2	-	
	$\frac{\sin 26°}{100} = \frac{\sin 64°}{WF}$		M1	
	$WF = 205\text{m}$ (3 s.f.)		A1	
	Alternatively, $\tan 64° = \frac{FW}{200}$	2	M1	
	$FW = 205$ m		A1	
22(c)	$\tan\theta = \frac{8 - 1.7}{205.030}$	2	M1	
	$\theta = 1.8°$		A1	

23(a)	$a = 1 \text{ m/s}^2$	1	B1	
23(b)	$30v = \frac{1}{2}(10)(5) + \frac{1}{2}(5+15)(10) + 10(15)$	3	M2	Or M1 for any 2 correct areas
	$v = 9\frac{1}{6}$ m/s or 9.17 m/s (3 s.f.)		A1	
24(a)	Triangle ABC is similar to triangle ADE. $\therefore \angle ADE = \angle ABC = 90°$ By Pythagoras' Theorem, $AD = \sqrt{8.5^2 - 7.5^2}$	2	M1	
	$= 4$ cm		A1	
24(b)	$\sin \angle AED = \frac{4}{8.5}$ $= \frac{8}{17}$	3	M1	
	$\cos \angle BED = -\cos \angle AED$ $= -\frac{7.5}{8.5}$ $= -\frac{15}{17}$		M1	
	$\sin \angle AED + \cos \angle BED = \frac{8}{17} - \frac{15}{17}$ $= -\frac{7}{17}$		A1	