

Neap:

HSC Trial Examination 2007

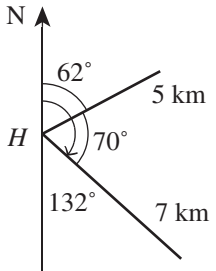
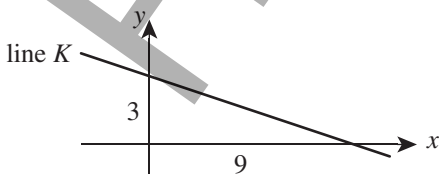
General Mathematics

Solutions and marking guidelines

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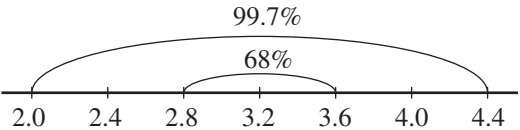
Section I

Answer and explanation		Content area assessed	Outcomes assessed
Question 1	C mass of 5 20c coins = $5 \times 8 = 40$ g value = $12\,000 \text{ g} \div 40 \text{ g}$ = \$300	M1	P2
Question 2	B $1 \text{ M} = 1.852 \text{ km}$ $9 \text{ km} = 9 \div 1.852 \text{ M}$ = 4.9 M to 1 decimal place	M7	P2
Question 3	D $V = 3 \times \frac{1}{2} \times \pi r^2 h$ $= 3 \times \frac{1}{2} \times \pi \times 4^2 \times 50\,000$ $= 3.8 \times 10^6 \text{ m}^3$	M2	P6
Question 4	C $62^\circ + 70^\circ = 132^\circ$ 	M6	H6
Question 5	D $\frac{0.5}{160} \times 100\% = 0.3125\%$	M1	P2
Question 6	C C (50° N, 100° E) Places on the same line of longitude have the same time.	M7	H6
Question 7	D A is wrong, as correlation doesn't show causation. Recent British studies have shown that fat consumption doesn't cause breast cancer. B is wrong, since the figures shown are per 100 000 women. C is wrong, since the correlation $\neq 1.2$. D is correct.	DA7	H7
Question 8	A  $m = -\frac{3}{9}$ $= -\frac{1}{3}$	DA7	H5

Section I (Continued)

Answer and explanation		Content area assessed	Outcomes assessed
Question 9	D $\frac{11+4}{36} = \frac{15}{36}$ $= \frac{5}{12}$	PB2	P10
Question 10	D The graph is exponential, so the equation is $P = 200 \times a^t$.	AM4	H5
Question 11	B The centre of any great circle is the centre of the Earth. The great circles include the equator and all meridians of longitude. The 20° S parallel is not a great circle, while the Prime Meridian and the equator are great circles.	M7	H6
Question 12	C His savings will total $200 \times \frac{(1.0075)^{48} - 1}{0.0075} = \$11\,504$. He will have invested $48 \times 200 = \$9600$. Hence the interest = $11\,504 - 9600 = \$1904$.	FM5	H8
Question 13	A A is correct. B is biased, as only Water Board employees are included. C is biased, as only people who are interested in a particular political party are included. D is biased, as the first entries in the phone book are not representative of all households.	DA2	P9
Question 14	A expectation = $\frac{1}{10} \times 40 + \frac{1}{2} \times 4 - 0.4 \times 8$ = \$2.80 He can expect to win \$2.80.	PB4	H10
Question 15	B $\frac{h}{200} = \sin 58^\circ$ $h = 200 \times \sin 58^\circ$ $= 169.6$ $= 170 \text{ m, to the nearest metre}$	M4	P2, P6
Question 16	C (A, B, C, D, E) and (6, 7, 8, 9) and (red, blue) gives $5 \times 4 \times 2 = 40$	PB3	H10

Section I (Continued)

Answer and explanation		Content area assessed Outcomes assessed						
Question 17	A $P(\text{heads}) = \frac{3}{5}$ $\therefore P(\text{tails}) = \frac{2}{5}$ expected number = $\frac{2}{5} \times 120$ $= 48$	PB4	H10					
Question 18	B The next row is <table border="1" style="margin-left: 20px;"> <tr> <td style="width: 100px; text-align: center;">2</td> <td style="width: 100px; text-align: center;">69 550</td> <td style="width: 100px; text-align: center;">347.75</td> <td style="width: 100px; text-align: center;">69 897.75</td> <td style="width: 100px; text-align: center;">69 097.75</td> </tr> </table> Correct to the nearest dollar, this is \$69 098.	2	69 550	347.75	69 897.75	69 097.75	FM4	H8
2	69 550	347.75	69 897.75	69 097.75				
Question 19	D $\sigma_n = 1.13$ to 2 decimal places $\sigma_{n-1} = 1.14$ to 2 decimal places $\sigma_{n-1} - \sigma_n = 0.01$ to 2 decimal places	DA4	P2					
Question 20	A  $\frac{1}{2} \times (99.7 - 68) = 15.85 \approx 16\%$	DA6	H9					
Question 21	A The other side of the triangle is $\sqrt{26^2 - 10^2} = 24$. area of $\Delta = \frac{1}{2} \times 24 \times 10$ $= 120 \text{ cm}^2$ area of semicircle = $\frac{1}{2} \times \pi \times 13^2$ required area = $\frac{1}{2} \times \pi \times 13^2 - 120$ $= 145.5 \text{ cm}^2$	M2	P2					
Question 22	B $F = \frac{9}{5}C + 32$ $-76 = \frac{9}{5}C + 32$ $-108 = \frac{9}{5}C$ $C = \frac{-108 \times 5}{9}$ $= -60$	AM3	H2					

Section II

Codes used in these answers:

CFPA means accept answer calculated Correct from Previous Answer.

ISE means Ignore Subsequent Error.

CNE means Correct Numerical Expression.

The only TE (Transcription Error) allowed is from the exam paper to the answer paper.

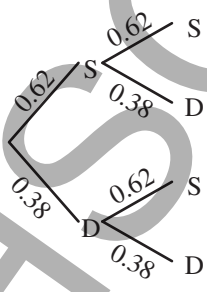
Question 23

Sample answer		Syllabus outcomes and marking guide	
(a)	(i) $5 \times 1.5 \times 14 = \105	FM1	P2 • Correct answer, \$105 1
	(ii) He earns \$28 per hour at double time. $84 \div 28 = 3$ hours	FM1	P2 • Correct answer, 3 hours (hours not required) 1
	(iii) Each week $35 \times 14 = 490$ $4 \times \frac{17.5}{100} \times 490 = \343	FM1	P2 • Correct answer, \$343 2 • Correct weekly wage OR $0.175 \times 4 \times$ weekly wage (error in wage) 1
(b)	(i) $\frac{5}{100} \times 68 = \3.40 She pays $68 - 3.40 = \$64.60$	M1	P2 • Correct answer, \$64.60 1
	(ii) $\frac{4}{128} \times 100 = 3.125\%$	M1	P2 • Correct answer, 3.125% 2 • $\frac{4}{1.28} \times 100$ OR • $\frac{4}{128} \times 100 =$ wrong answer 1
	(iii) Let the price be x cents per litre. $\frac{5}{100} \times x = 4$ $x = \frac{4 \times 100}{5}$ $= 80c$	M1	H2 • Correct answer, 80c 2 • Progress towards a solution, e.g. setting up an equation 1
(c)	35° S to 65° N = 100° $\frac{100}{360} \times 2 \times \pi \times 6400 = 11\,170.107$ $\approx 11\,170$ km (Accept $100 \times 60 \times 1.852 = 11\,112$ km)	M7	H6 • Correct answer, 11 170 km (accept 11 112 km) 2 • Correct rounding of incorrect answer OR • Correct answer wrongly rounded or not rounded 1
(d)	(i) $3.6 \div 0.9 = 4$	M3	P6 • Correct answer 1
	(ii) $1.2 \times 4 = 4.8$ m	M3	P6 • $1.2 \times$ CFPA 1

Question 24

Sample answer	Syllabus outcomes and marking guide
(a) $\frac{8aab}{3x} \times \frac{x}{ab} = \frac{8a}{3}$	AM1 P2 • Correct answer, $\frac{8a}{3}$ 1
(b) (i) $\cos\theta = \frac{16^2 + 9^2 - 20^2}{2 \times 16 \times 9}$ $\theta = 103^\circ$	M6 H6 • Correct answer, 103° (ignore rounding) . 2 • Attempt to use the cosine rule 1
(ii) $\frac{x}{\sin 49^\circ} = \frac{16}{\sin 51^\circ}$ $x = \frac{16 \times \sin 49^\circ}{\sin 51^\circ}$ $= 15.5$ m to 1 decimal place	M6 H6 • Correct answer, 15.5 (ignore rounding) .. 2 • Attempt to use the sine rule 1
(c) (i) $60 - (4 + 6 + 42) = 8$	PB4 H10 • Correct answer, 8 1
(ii) $50 : 10 = 5 : 1$	M1 P2 • Accept $50 : 10$ or $(42 + \text{CFPA}) : 10$.. 1
(iii) $\frac{14}{60} = \frac{7}{30}$	PB2 H10 • Accept $\frac{14}{60}$ or $\frac{\text{CFPA} + 6}{60}$ 1
(d) (i) $\text{GST} = 26\,400 \div 11$ $= \$2400$ Suzette's GST-free earnings = $26\,400 - 2400$ $= \$24\,000$ Suzette's PAYG = $\frac{18}{100} \times 24\,000$ $= \$4320$ Total to pay to tax office = $\text{GST} + \text{PAYG}$ $= 2400 + 4320$ $= \$6720$	FM3 H8 • Correct answer (accept CNE) 3 • Makes significant progress towards a solutions (CNE) 2 • Makes some progress (e.g. finds GST) OR • Finds 18% of what they believe Suzette's GST-free earnings are (CNE)..... 1
(ii) $V = P(1 - r)^n$ $= 4200(1 - 0.25)^3$ $= \$1771.88$	FM6 H8 • Correct value (ignore rounding)..... 2 • Maximum of 1 error in substituting numbers into the correct formula 1

Question 25

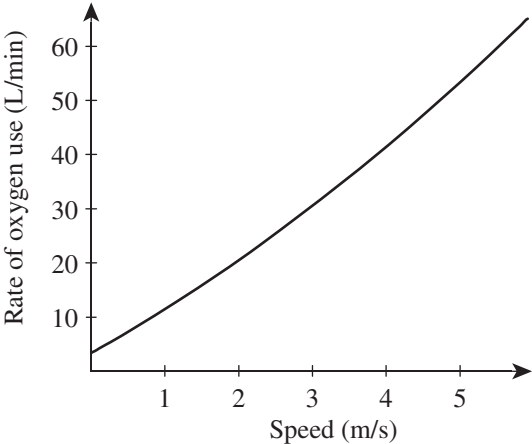
Sample answer	Syllabus outcomes and marking guide
<p>(a) area of triangle = $\frac{1}{2} \times 55 \times 48 \times \sin 72^\circ$ $= 1255.4 \text{ m}^2$ Simpson's rule 1: $\frac{12}{3}(34 + 40 + 4 \times 38) = 904 \text{ m}^2$ Simpson's rule 2: $\frac{12}{3}(40 + 60 + 4 \times 50) = 1200 \text{ m}^2$ total area = $1255.4 + 904 + 1200$ $= 3359.4 \text{ m}^2$</p>	<p>M6, M5 H6</p> <ul style="list-style-type: none"> Correct answer (ignore rounding) 4 Makes significant progress towards the solution. 3 Correctly finds the area of one piece and correctly attempts to find the area of another piece. 2 Correctly attempts to find the area of one section (e.g. triangle or one part of Simpson's rule) 1
<p>(b) (i) 25 million</p>	<p>DA5 H7</p> <ul style="list-style-type: none"> Accept an answer in the range $22 \text{ million} < \text{answer} \leq 30 \text{ million}$ 1
<p>(ii) The number of bellbirds is largest in August, September and October, so the season is spring.</p>	<p>DA5 H7</p> <ul style="list-style-type: none"> Spring (accept August, September, October) 1
<p>(iii) The number of bellbirds is low when the number of insects is low. The number of bellbirds increases about two weeks after the number of insects increases.</p> <p>Both bird and insect numbers are relatively low in November, December, May and June. Both numbers are relatively high in September and March.</p>	<p>DA5 H11</p> <ul style="list-style-type: none"> Two correct comparisons and no incorrect statements. 2 One correct comparison and no incorrect statements. 1 <p><i>Ignore any mention of birds eating insects in all answers.</i></p>
<p>(c) $V = \frac{1}{2} \times \frac{4}{3} \pi r^3$ $= \frac{1}{2} \times \frac{4}{3} \times \pi \times 9^3$ $= 1526.814$ $= 1527 \text{ cm}^3$</p>	<p>PB3 H10</p> <ul style="list-style-type: none"> Correct answer, 1527 cm^3 (ignore rounding) 2 Some progress (e.g. uses the correct formula but omits the $\frac{1}{2}$) 1
<p>(d) (i)</p>  <p>$0.62 \times 0.62 = 0.3844$</p>	<p>PB3 H10</p> <ul style="list-style-type: none"> Correct answer, 0.3844 (accept $(0.62)^2$) 1
<p>(ii) $1 - P(\text{both die}) = 1 - 0.38 \times 0.38$ $= 0.8556$</p>	<p>PB3 H10</p> <ul style="list-style-type: none"> Correct answer (CNE) 2 Correct tree diagram showing 0.62 and 0.38 1

Question 26

Sample answer	Syllabus outcomes and marking guide
(a) (i) 43	DA5 H9 • Correct answer 1 (Note: 34 is wrong.)
(ii) 41	DA5 H9 • Correct answer 1
(iii) Males, because $76 - 31$ is smaller than $80 - 21$.	DA5 H11 • Correct answer (accept '45 is smaller than 59' as the reason) 1
(iv) The female group, because its tail is larger	DA5 H11 • Correct answer 1
(b) (i)	M2 P6 • Any correct net with sides close to the correct proportions (dimensions not required) 1
(ii) areas A and B = $2 \times 1.5 + \frac{1}{2} \times \pi \times 1^2$ = 4.57 m ² areas C and E = 3×1.5 = 4.5 m ² area D = $\pi \times 3$ = 9.42 m ² total = $2 \times 4.57 + 2 \times 4.5 + 9.42$ = 27.56 m ²	M5 H6 • Correct answer 3 • Significant progress 2 • Finds one area correctly 1

Question 26 (Continued) Sample answer	Syllabus outcomes and marking guide
(b) (iii) lengths for 4 verticals = 4×1.5 lengths for 3 horizontals = 3×3 lengths for 2 semicircles = $2 \times \frac{1}{2} \times \pi \times 2$ $= 2\pi$ total length = $6 + 9 + 2\pi$ $= 21.3 \text{ m}$	M2 P6 • Correct answer 2 • Calculates the length of one semicircular piece (CNE) OR • Calculates the total length of the four verticals and three horizontals (CNE) . . . 1
(c) (i) $A = P(1 + r)^n$ final amount $A = 2000$ $r = \frac{5}{100} = 0.05$ $n = x$ initial investment $P = 1000$ $2000 = 1000(1 + 0.05)^x$ This is the same as $1000(1.05)^x = 2000$.	FM2 P8 • Correct values substituted into the compound interest formula 1
(ii) Let $x = 12$. Try $1000(1.05)^{12} = 1795.9$ Try $1000(1.05)^{14} = 1979.90$ Try $1000(1.05)^{15} = 2078.93$ Try $1000(1.05)^{14.5} = 2028.83$ It will take between 14 and 15 years. To the nearest year, it will take 14 years.	AM3 H8 • 14 years, by any method (accept 15 years) 1
(iii) Change the interest rate to 10% p.a. $1000(1.1)^x = 2000$ $x \approx 7 \text{ years}$ Change the investment to \$16000. $16\,000(1.05)^x = 32\,000$ $x \approx 14 \text{ years}$ The size of the investment doesn't matter. The interest rate determines the time it takes to double.	AM3 H11 • Correct response (interest rate) supported by an appropriate calculation 1

Question 28

Sample answer		Syllabus outcomes and marking guide														
(a)	(i) Speed is always positive.	AM2 P11 • Any correct reason 1														
(ii)	<table border="1" style="display: inline-table; margin-right: 20px;"> <tr> <td>x</td> <td>0</td> <td>1</td> <td>2</td> <td>3</td> <td>4</td> <td>5</td> </tr> <tr> <td>R</td> <td>0.25</td> <td>8.75</td> <td>18.25</td> <td>28.75</td> <td>40.25</td> <td>52.75</td> </tr> </table> 	x	0	1	2	3	4	5	R	0.25	8.75	18.25	28.75	40.25	52.75	AM4 H4 • The correct graph must have both axes labelled, linear scale on both axes, graph with correct curvature in the correct position. Table of values is not required . 3 • An essentially correct graph lacking either a label or a scale 2 • Graph with correct curvature OR • Scales and axes labelled correctly OR • Correct table of values 1
x	0	1	2	3	4	5										
R	0.25	8.75	18.25	28.75	40.25	52.75										
(iii)	$R = 12$ $x \approx 1.35$	AM4 H2 • Accept $x = 1.3, 1.35, 1.4$ or value from their graph 1														
(iv)	Amba's maximum speed was $x = 3.2$. Her maximum R was $\frac{1}{2} \times (3.2)^2 + 8 \times 3.2 + \frac{1}{4} = 30.97$ litres per minute	AM4 H7 • Correct answer 2 • Uses the relationship between the pairs of graph or between the graph in (iv) and the equation in (a) 1														
(v)	Amba took about 82 s to complete the race at a 'typical speed' of 2.5 m/s. $d = s \times t$ $= 82 \times 2.5$ $= 205$ m The race was probably 200 m long.	AM4 H11 • Uses the graph to determine the time for the race and an appropriate 'typical speed' to determine 200 m 2 • Uses a $d = s \times t$ link 1														
(b)	(i) 75% of 80 = 60	DA3 P2 • Correct answer 1														

Question 28 (Continued)

Sample answer

(b) (ii) Original data:

30–40	20
40–45	20
45–55	20
55–60	20

New data:

28	1
30–40	24
40–45	20
45–55	35
55–60	20

100

The new box-and-whisker plot will have 25 people in each section.

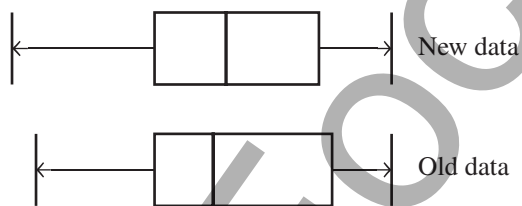
The bottom whisker will stop at 28.

The bottom of the box will stop at 40.

The middle of the box will be '5 people' bigger than 45.

The top of the box will be '5 people' smaller than 55.

The top whisker will stop at 60.



Summary:

	Old	New
Lowest	30	28
Low Q	40	40
Median	45	> 45
Upper Q	55	< 55
Highest	60	60

Syllabus outcomes and marking guide

DA5

H11

- Correct comparison at each of the 5 summary points 3
- Correct comparison at 4 of the 5 summary points 2
- Correct comparison at 2 of the 5 summary points and **no** wrong conclusion 1