

只限教師參閱 FOR TEACHERS' USE ONLY

**香港考試及評核局
HONG KONG EXAMINATIONS AND ASSESSMENT AUTHORITY**

**2009年香港中學會考
HONG KONG CERTIFICATE OF EDUCATION EXAMINATION 2009**

**數學 試卷一
MATHEMATICS PAPER 1**

本評卷參考乃香港考試及評核局專為今年本科考試而編寫，供閱卷員參考之用。閱卷員在完成閱卷工作後，若將本評卷參考提供其任教會考班的本科同事參閱，本局不表反對，但須切記，在任何情況下均不得容許本評卷參考落入學生手中。學生若索閱或求取此等文件，閱卷員/教師應嚴詞拒絕，因學生極可能將評卷參考視為標準答案，以致但知硬背死記，活剝生吞。這種落伍的學習態度，既不符現代教育原則，亦有違考試着重理解能力與運用技巧之旨。因此，本局籲請各閱卷員/教師通力合作，堅守上述原則。

This marking scheme has been prepared by the Hong Kong Examinations and Assessment Authority for markers' reference. The Authority has no objection to markers sharing it, after the completion of marking, with colleagues who are teaching the subject. However, under no circumstances should it be given to students because they are likely to regard it as a set of model answers. Markers/teachers should therefore firmly resist students' requests for access to this document. Our examinations emphasise the testing of understanding, the practical application of knowledge and the use of processing skills. Hence the use of model answers, or anything else which encourages rote memorisation, should be considered outmoded and pedagogically unsound. The Authority is counting on the co-operation of markers/teachers in this regard.



Hong Kong Certificate of Education Examination
Mathematics Paper 1

General Marking Instructions

1. It is very important that all markers should adhere as closely as possible to the marking scheme. In many cases, however, candidates will have obtained a correct answer by an alternative method not specified in the marking scheme. In general, a correct answer merits *all the marks* allocated to that part, unless a particular method has been specified in the question. Markers should be patient in marking alternative solutions not specified in the marking scheme.
2. In the marking scheme, marks are classified into the following three categories:

‘M’ marks	awarded for correct methods being used;
‘A’ marks	awarded for the accuracy of the answers;
Marks without ‘M’ or ‘A’	awarded for correctly completing a proof or arriving at an answer given in a question.

In a question consisting of several parts each depending on the previous parts, ‘M’ marks should be awarded to steps or methods correctly deduced from previous answers, even if these answers are erroneous. However, ‘A’ marks for the corresponding answers should NOT be awarded (unless otherwise specified).
3. For the convenience of markers, the marking scheme was written as detailed as possible. However, it is still likely that candidates would not present their solution in the same explicit manner, e.g. some steps would either be omitted or stated implicitly. In such cases, markers should exercise their discretion in marking candidates’ work. In general, marks for a certain step should be awarded if candidates’ solution indicated that the relevant concept/technique had been used.
4. Use of notation different from those in the marking scheme should not be penalized.
5. In marking candidates’ work, the benefit of doubt should be given in the candidates’ favour.
6. Marks may be deducted for wrong units (*u*) or poor presentation (*pp*).
 - a. The symbol *(u-1)* should be used to denote 1 mark deducted for *u*. At most deduct **1 mark** for *u* in each of Section A(1) and Section A(2). Do not deduct any marks for *u* in Section B.
 - b. The symbol *(pp-1)* should be used to denote 1 mark deducted for *pp*. At most deduct **1 mark** for *pp* in each of Section A(1) and Section A(2). Do not deduct any marks for *pp* in Section B.
 - c. At most deduct 1 mark in each of Section A(1) and Section A(2).
 - d. In any case, do not deduct any marks for *pp* or *u* in those steps where candidates could not score any marks.
7. In the marking scheme, ‘r.t.’ stands for ‘accepting answers which can be rounded off to’ and ‘f.t.’ stands for ‘follow through’. Steps which can be skipped are shaded whereas alternative answers are enclosed with rectangles. All fractional answers must be simplified.

	Solution	Marks	Remarks
1.	$\frac{3n - 5m}{2} = 4$ $3n - 5m = (2)(4)$ $3n = 8 + 5m$ $n = \frac{8 + 5m}{3}$	1M 1M 1A	for putting n on one side or equivalent
	$\frac{3n - 5m}{2} = 4$ $\frac{3n}{2} - \frac{5m}{2} = 4$ $\frac{3n}{2} = 4 + \frac{5m}{2}$ $n = \frac{8}{3} + \frac{5m}{3}$	1M 1M 1A	for putting n on one side or equivalent
2.	$\frac{x^2}{(x^{-7}y)^3}$ $= \frac{x^2}{x^{-21}y^3}$ $= \frac{x^{2+21}}{y^3}$ $= \frac{x^{23}}{y^3}$	1M 1M 1A	for $(ab)^k = a^k b^k$ or $(a')^k = a'^k$ for $\frac{1}{c^{-m}} = c^m$ or $\frac{c^n}{c^m} = c^{n-m}$
3.	<p>(a) $a^2b + ab^2$ $= ab(a + b)$</p> <p>(b) $a^2b + ab^2 + 7a + 7b$ $= ab(a + b) + 7a + 7b$ $= ab(a + b) + 7(a + b)$ $= (a + b)(ab + 7)$</p>	1A 1M 1A	or equivalent for using the result of (a) or equivalent

	Solution	Marks	Remarks
4.	(a) 405.504 $= 406$ (correct to the nearest integer)	1A	
	(b) 405.504 $= 405.50$ (correct to 2 decimal places)	1A	
	(c) 405.504 $= 410$ (correct to 2 significant figures)	1A -----(3)	
5.	The required probability $= \frac{7+21}{7+21+30+53+57+32}$ $= \frac{28}{200}$ $= \frac{7}{50}$	1M + 1M 1A -----(3)	1M for numerator + 1M for denominator 0.14
6.	Let x be the number of stamps owned by John. Then, the number of stamps owned by Mary is $(300 - x)$. $4x = (300 - x) + 20$ $4x = 320 - x$ $5x = 320$ $x = 64$ Thus, the number of stamps owned by John is 64.	1A 1M + 1A 1A	pp-1 for any undefined symbol can be absorbed
	Let x and y be the numbers of stamps owned by John and Mary respectively. $\begin{cases} x + y = 300 \\ 4x = y + 20 \end{cases}$ So, we have $4x = (300 - x) + 20$. Solving, we have $x = 64$. Thus, the number of stamps owned by John is 64.	1A + 1A 1M 1A -----(4)	pp-1 for any undefined symbol for getting a linear equation in x or y only

	Solution	Marks	Remarks
7. (a)	<p>The required number $= 172(1 - 75\%)$ $= 43$</p>	1M 1A	can be absorbed
(b)	<p>The required percentage $= \left(\frac{43}{43+172} \right) (100\%)$ $= 20\%$</p>	1M 1A	accept without 100 %
	<p>The required percentage $= \left(1 - \frac{172}{43+172} \right) (100\%)$ $= 20\%$</p>	1M 1A	accept without 100 %
	<p>The required percentage $= \left(\frac{1 - 75\%}{1 + (1 - 75\%)} \right) (100\%)$ $= 20\%$</p>	1M 1A	accept without 100 %
		----- (4)	
8. (a)	<p>$\angle POQ$ $= 213^\circ - 123^\circ$ $= 90^\circ$</p> <p>Thus, $\triangle OPQ$ is a right-angled triangle.</p>	1M 1A	for considering $\angle POQ$ f.t.
(b)	<p>$k^2 + 24^2 = 25^2$ $k = 7$</p> <p>The perimeter of $\triangle OPQ$ $= 7 + 24 + 25$ $= 56$</p>	1M 1A 1M	for using Pythagoras' theorem ----- (5)
9. (a)	<p>The coordinates of A' are $(-1, 4)$. The coordinates of B' are $(-5, 2)$.</p>	1A 1A	pp-1 for missing '(' or ')' pp-1 for missing '(' or ')'
(b)	<p>The slope of AB $= \frac{2 - (-2)}{5 - (-1)}$ $= \frac{2}{3}$</p> <p>The slope of $A'B'$ $= \frac{4 - 2}{-1 - (-5)}$ $= \frac{1}{2}$</p> <p>Since the slope of AB and the slope of $A'B'$ are different, AB is not parallel to $A'B'$.</p>	1M 1A 1A 1A	<p>either one either one</p>
		1A	f.t. ----- (5)

	Solution	Marks	Remarks
10. (a)	<p>The median $= 26$ words per minute</p> <p>The range $= 39 - 12$ $= 27$ words per minute</p> <p>The inter-quartile range $= 35 - 21$ $= 14$ words per minute</p>	1A 1A 1A -----(3)	u-1 for missing unit u-1 for missing unit u-1 for missing unit
(b) (i)	<p>The inter-quartile range after the training $= 47 - 35$ $= 12$ words per minute</p> <p>The inter-quartile range of the distribution of typing speed after the training is less than that before the training. Thus, the distribution after the training is not more dispersed than that before the training.</p>	1M	for considering inter-quartile range f.t.
	<p>The range after the training $= 52 - 27$ $= 25$ words per minute</p> <p>The range of the distribution of typing speed after the training is less than that before the training. Thus, the distribution after the training is not more dispersed than that before the training.</p>	1M 1A	for considering range f.t.
(ii)	<p>Note that the median of the distribution of the typing speed after the training is 40 words per minute which is greater than the maximum of the distribution of the typing speed before the training. Thus, the claim is agreed.</p> <p>Note that the minimum of the distribution of the typing speed after the training is 27 words per minute which is greater than the median of the distribution of the typing speed before the training. Thus, the claim is agreed.</p>	1M 1A -----(4)	f.t.

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	Solution	Marks	Remarks
11.	Marking Schemes for (a) and (b)(i): Case 1 Any correct proof with correct reasons. Case 2 Any correct proof without reasons. Case 3 Incomplete proof with any one correct step and one correct reason.	3 2 1	
	(a) In $\triangle ABC$ and $\triangle AED$, $AC = AD$ (given) $BC = ED$ (given) $\angle ACB + \angle BCE = \angle ADE + \angle CAD$ (ext. \angle of \triangle) $\angle BCE = \angle CAD$ (given) $\angle ACB = \angle ADE$ $\triangle ABC \cong \triangle AED$ (SAS)		[已知] [已知] [\triangle 的外角] [已知]
		-----(3)	
	(b) (i) In $\triangle ABF$ and $\triangle DEA$, $\angle AFB = \angle DAE$ (alt. \angle s, $AD \parallel BC$) $\angle FBA = \angle AED$ (by (a)) $\angle FAB = \angle ADE$ (\angle sum of \triangle) $\triangle ABF \sim \triangle DEA$ (AAA)		[(内)錯角, $AD \parallel BC$] [由(a)] [\triangle 內角和] (AA) (equiangular) [等角]
	(ii) $\triangle CBA$ and $\triangle CEF$ are similar to $\triangle ABF$.	1A + 1A -----(5)	

Solution	Marks	Remarks
12. (a) (i) The equation of the axis of symmetry is $x = 11$. (ii) The coordinates of R are $(11, 23)$.	1A 1A ----- (2)	or equivalent pp-1 for missing '(' or ')'
(b) (i) $-2(x-11)^2 + 23 = 5$ $(x-11)^2 = 9$ $x-11=3$ or $x-11=-3$ $x=14$ or $x=8$	1M 1A	
$\begin{aligned} -2(x-11)^2 + 23 &= 5 \\ 2x^2 - 44x + 224 &= 0 \\ x^2 - 22x + 112 &= 0 \\ (x-8)(x-14) &= 0 \\ x=8 \text{ or } x &= 14 \end{aligned}$	1M 1A	
The distance between P and Q $= 14 - 8$ $= 6$	1M 1A	can be absorbed
(ii) The area of $\triangle PQR$ $= \frac{(6)(23-5)}{2}$ $= 54$	1M 1A	
The area of $\triangle PSQ$ $= \frac{(6)(5)}{2}$ $= 15$		either one either one
The area of the quadrilateral $PRQS$ $= 54 + 15$ $= 69$	1A	
The area of the quadrilateral $PRQS$ $= \frac{(6)(23)}{2}$ $= 69$	1M + 1A 1A ----- (7)	

Solution	Marks	Remarks
<p>13. (a) (i) The capacity of the container $= \frac{1}{3}\pi(12)^2(18)$ $= 864\pi \text{ cm}^3$</p>	1M 1A	u-1 for missing unit
<p>(ii) Let $r \text{ cm}$ be the base radius of the lower part of the container. Then, we have $\frac{18-6}{18} = \frac{r}{12}$. Solving, we have $r = 8$. The volume of frustum $= 864\pi - \frac{1}{3}\pi(8)^2(18-6)$ $= 864\pi - 256\pi$ $= 608\pi \text{ cm}^3$</p>	1M 1A	u-1 for missing unit
<p>Let $V \text{ cm}^3$ be the volume of the frustum. Then, we have $\frac{864\pi - V}{864\pi} = \left(\frac{18-6}{18}\right)^3$. So, we have $\frac{864\pi - V}{864\pi} = \frac{8}{27}$. Solving, we have $V = 608\pi$. Thus, the volume of the frustum is $608\pi \text{ cm}^3$.</p>	1M 1A	u-1 for missing unit
(b) (i) The capacity of the lower part of the vessel $= \pi(8)^2(10)$ $= 640\pi \text{ cm}^3$ Let $h \text{ cm}$ be the depth of water in the vessel. $\left(\frac{h-10+(18-6)}{18}\right)^3 = \frac{(884\pi - 640\pi) + (864\pi - 608\pi)}{864\pi}$ $\left(\frac{h+2}{18}\right)^3 = \frac{125}{216}$ $\frac{h+2}{18} = \frac{5}{6}$ $h = 13$ Thus, the depth of water in the vessel is 13 cm .	1M 1M 1M 1A	u-1 for missing unit
(ii) The volume not occupied by water in the vessel $= 608\pi + 640\pi - 884\pi$ $= 364\pi \text{ cm}^3$ Note that the volume of metal is 1000 cm^3 . So, the volume of metal is less than $364\pi \text{ cm}^3$. Thus, the water will not overflow.	1M 1A	for comparison f.t.

Solution	Marks	Remarks
<p>14. (a) The mean lifetime of the batch of light bulbs of brand A $= \frac{(1050)(8) + (1150)(50) + (1250)(42) + (1350)(10) + (1450)(10)}{120}$ $= 1220 \text{ h}$</p> <p>The mean lifetime of the batch of light bulbs of brand B $= \frac{(1050)(4) + (1150)(12) + (1250)(40) + (1350)(36) + (1450)(28)}{120}$ $= 1310 \text{ h}$</p> <p>Since the mean lifetime of the batch of light bulbs of brand A is less than that of brand B, light bulbs of brand B are likely to have a longer lifetime.</p>	1A	either one
	1A	f.t.
<p>Note that the median of the lifetime of the batch of light bulbs of brand A lies in the class $1200 \leq x < 1300$.</p> <p>Also note that the median of the lifetime of the batch of light bulbs of brand B lies in the class $1300 \leq x < 1400$.</p> <p>Since the median of the lifetime of the batch of light bulbs of brand A is less than that of brand B, light bulbs of brand B are likely to have a longer lifetime.</p>	1A	either one
	1A	f.t.
<p>Note that the modal class of the lifetime of the batch of light bulbs of brand A is the class $1100 \leq x < 1200$.</p> <p>Also note that the modal class of the lifetime of the batch of light bulbs of brand B is the class $1200 \leq x < 1300$.</p> <p>Therefore, light bulbs of brand B are likely to have a longer lifetime.</p>	1A 1A	either one f.t.
	(2)	
<p>(b) (i) The required probability $= \frac{8+50+42}{120}$ $= \frac{5}{6}$</p>	1M 1A	for numerator r.t. 0.833
<p>(ii) The required probability $= 1 - \left(\frac{5}{6} \right) \left(\frac{99}{119} \right)$ $= \frac{73}{238}$</p>	1M + 1A 1A	for $1 - ((b)(i))p$ where $p < 1$ r.t. 0.307
<p>(iii) The required probability by adopting Method 1 $= \frac{1}{2} \left(\frac{73}{238} \right) + \frac{1}{2} \left(1 - \left(\frac{56}{120} \right) \left(\frac{55}{119} \right) \right)$ $= \frac{779}{1428}$</p> <p>The required probability by adopting Method 2 $= 1 - \left(\frac{5}{6} \right) \left(\frac{56}{120} \right)$ $= \frac{11}{18}$</p> <p>Since $\frac{779}{1428} < \frac{11}{18}$, Method 2 will be adopted.</p>	1M + 1A 1A 1A	for $\frac{1}{2}((b)(ii)) + \frac{1}{2} \left(1 - \left(\frac{r}{120} \right) \left(\frac{r-1}{119} \right) \right)$ where $0 < r < 120$ r.t. 0.546 either one r.t. 0.611
	1A	f.t.
	(9)	

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Solution	Marks	Remarks
<p>15. (a) (i) The taxi fare $= 30 + \frac{x-2}{0.2} (2.4)$ $= 30 + 12(x-2)$ $= \\$ (6 + 12x)$</p> <p>(ii) If x is not a multiple of 0.2, then the distance used for calculating the taxi fare is the estimated distance after rounding up to the nearest 0.2 km instead of the actual distance travelled. Thus, the taxi fare is not $\\$ (6 + 12x)$.</p>	1 1A -----(2)	
<p>(b) Note that the distance used for calculating the taxi fare is 3.2 km . The taxi fare $= 6 + (12)(3.2)$ $= \\$ 44.4$</p>	1A 1M 1A -----(3)	can be absorbed
<p>(c) The taxi fare for the 2nd journey $= 6 + (12)(3.6)$ $= \\$ 49.2$</p> <p>The distance covered by the 99th journey $= 3.1 + (99 - 1)(0.5)$ $= 52.1 \text{ km}$</p> <p>The taxi fare for the 99th journey $= 6 + (12)(52.2)$ $= \\$ 632.4$</p> <p>The total taxi fare $= 44.4 + 49.2 + 56.4 + 61.2 + \dots + 625.2 + 632.4$ $= (44.4 + 56.4 + \dots + 632.4) + (49.2 + 61.2 + \dots + 625.2)$ $= \frac{(44.4 + 632.4)(50)}{2} + \frac{(49.2 + 625.2)(49)}{2}$ $= 16920 + 16522.8$ $= \\$ 33442.8$ $> \\$ 33000$</p> <p>Thus, the claim is incorrect.</p>	1A 1M 1M+1A+1A 1A f.t.	can be absorbed for splitting into two arithmetic sequences 1M for summing either arithmetic sequence + 1A for correct number of terms in each series
<p>The taxi fare for the 2nd journey $= 6 + (12)(3.6)$ $= \\$ 49.2$</p> <p>The total taxi fare $= 44.4 + 49.2 + 56.4 + 61.2 + \dots + 625.2 + 632.4$ $= (44.4 + 56.4 + \dots + 632.4) + (49.2 + 61.2 + \dots + 625.2)$ $= \frac{((2)(44.4) + (50 - 1)(12)(50))}{2} + \frac{((2)(49.2) + (49 - 1)(12)(49))}{2}$ $= 16920 + 16522.8$ $= \\$ 33442.8$ $> \\$ 33000$</p> <p>Thus, the claim is incorrect.</p>	1A 1M 1M+1A+1A 1A f.t.	can be absorbed for splitting into two arithmetic sequences 1M for summing either arithmetic sequence + 1A for correct number of terms in each series

	Solution	Marks	Remarks
16 (a) (i)	<p>The slope of L_1 $= \frac{24-16}{12-8}$ $= 2$</p> <p>The equation of L_1 is $y - 16 = 2(x - 8)$ $2x - y = 0$</p> <p>The slope of L_2 $= \frac{-1}{2}$</p> <p>The equation of L_2 is $y - 24 = \frac{-1}{2}(x - 12)$ $x + 2y - 60 = 0$</p> <p>(ii) The system of inequalities is</p> $\begin{cases} x \geq 8 \\ y \geq 10 \\ 2x \geq y \\ x + 2y \leq 60 \end{cases}$	1M 1A	or equivalent
			either one
(b)	<p>Let x and y be the numbers of square tables and round tables placed respectively.</p> <p>Now, the constraints are $x \geq 8$, $y \geq 10$, $2x \geq y$ and $x + 2y \leq 60$.</p> <p>Denote the total profit on the dining tables by $\\$P$.</p> <p>Then, we have $P = 4000x + 6000y$.</p> <p>Note that the vertices of the shaded region are $(12, 24)$, $(40, 10)$, $(8, 10)$ and $(8, 16)$.</p> <p>At $(12, 24)$, we have $P = (4000)(12) + (6000)(24) = 192000$.</p> <p>At $(40, 10)$, we have $P = (4000)(40) + (6000)(10) = 220000$.</p> <p>At $(8, 10)$, we have $P = (4000)(8) + (6000)(10) = 92000$.</p> <p>At $(8, 16)$, we have $P = (4000)(8) + (6000)(16) = 128000$.</p> <p>So, the greatest value of P is 220000.</p> <p>Thus, the claim is disagreed.</p>	1A 1A+1A+1A 1A	or equivalent or equivalent f.t.
	<p>Let x and y be the numbers of square tables and round tables placed respectively.</p> <p>Now, the constraints are $x \geq 8$, $y \geq 10$, $2x \geq y$ and $x + 2y \leq 60$.</p> <p>Denote the total profit on the dining tables by $\\$P$.</p> <p>Then, we have $P = 4000x + 6000y$.</p> <p>Draw the straight line $2x + 3y = k$ on Figure 5, where k is a constant.</p> <p>It is found that P attains its greatest value at $(40, 10)$.</p> <p>So, the greatest value of P is 220000.</p> <p>Thus, the claim is disagreed.</p>	1A 1M + 1M 1A 1A	1M for testing a point + 1M for testing four points f.t.
			(5)

Solution	Marks	Remarks
17. (a) (i) By cosine formula, we have $CD^2 = BC^2 + BD^2 - 2(BC)(BD)\cos \angle ABC$ $CD^2 = 25^2 + 6^2 - 2(25)(6)\cos 57^\circ$ $CD \approx 22.30713539$ <p>Thus, the length of CD is 22.3 cm .</p>	1M	
(ii) By sine formula, we have $\frac{\sin \angle BAC}{BC} = \frac{\sin \angle ABC}{AC}$ $\frac{\sin \angle BAC}{25} = \frac{\sin 57^\circ}{28}$ $\angle BAC \approx 48.48766126^\circ$ $\angle BAC \approx 48.5^\circ$	1M	r.t. 22.3 cm
(iii) The area of ΔABC $= \frac{1}{2}(AC)(BC)\sin \angle ACB$ $\approx \frac{1}{2}(28)(25)\sin(180^\circ - 57^\circ - 48.48766126^\circ)$ ≈ 337.2907934 $\approx 337 \text{ cm}^2$	1M	accept Heron's formula r.t. 337 cm^2
(iv) CE $= \sqrt{BC^2 - BE^2}$ $= \sqrt{25^2 - 24^2}$ $= 7 \text{ cm}$ AE $= \sqrt{AC^2 - CE^2}$ $= \sqrt{28^2 - 7^2}$ $= \sqrt{735} \text{ cm}$ <p>By cosine formula, we have $AB^2 = AC^2 + BC^2 - 2(AC)(BC)\cos \angle ACB$ $AB^2 \approx 28^2 + 25^2 - 2(28)(25)\cos(180^\circ - 57^\circ - 48.48766126^\circ)$ $AB \approx 32.17385288 \text{ cm}$ Let $s = \frac{AB + AE + BE}{2}$ The area of ΔABE $= \sqrt{s(s - AB)(s - AE)(s - BE)}$ $\approx 317.9377429 \text{ cm}^2$ </p> <p>Let h cm be the shortest distance from E to the horizontal ground.</p>	1M	----- either
$\frac{h}{3}(\text{The area of } \Delta ABC) = \frac{1}{3}(\text{The area of } \Delta ABE)(CE)$ $\frac{h}{3}(337.2907934) \approx \frac{1}{3}(317.9377429)(7)$ $h \approx 6.598354428$ $h \approx 6.60$ <p>Thus, the required distance is 6.60 cm .</p>	1A	r.t. 6.60 cm -----(9)

Solution	Marks	Remarks
<p>(b) $\frac{DE}{CD^2 - CE^2}$ $\approx \sqrt{22.30713539^2 - 7^2}$ $\approx 21.1803751 \text{ cm}$</p> <p>Let d be the perpendicular distance from E to CD. Then, we have $\frac{d(CD)}{2} = \frac{(CE)(DE)}{2}$. Therefore, we have $d = \frac{(CE)(DE)}{CD}$.</p> <p>The perpendicular distance from E to CD $= \frac{(CE)(DE)}{CD}$ $\approx \frac{(7)(21.1803751)}{22.30713539}$ $\approx 6.646421565 \text{ cm}$</p> <p>So, the perpendicular distance from E to CD and the shortest distance from E to the horizontal ground are different. Thus, the claim is disagreed.</p>	1M	accept equating sine ratios
<p>$\frac{DE}{CD^2 - CE^2}$ $\approx \sqrt{22.30713539^2 - 7^2}$ $\approx 21.1803751 \text{ cm}$</p> <p>Let θ be the angle between DE and the horizontal ground. $\sin \theta = \frac{\text{The shortest distance from } E \text{ to the horizontal ground}}{DE}$ $\sin \theta \approx \frac{6.598354429}{21.1803751}$ $\theta \approx 18.1515512^\circ$</p> <p>$\sin \angle CDE = \frac{CE}{CD}$ $\sin \angle CDE \approx \frac{7}{22.30713539}$ $\angle CDE \approx 18.28844266^\circ$</p> <p>So, $\angle CDE$ and the angle between DE and the horizontal ground are different. Thus, the claim is disagreed.</p>	1A	f.t.
	-----(2)	