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

香港中學文憑考試
HONG KONG DIPLOMA OF SECONDARY EDUCATION EXAMINATION

練習卷
PRACTICE PAPER

數學　　必修部分　　試卷一

MATHEMATICS　COMPULSORY PART　PAPER 1

評卷參考
MARKING SCHEME

本評卷參考乃香港考試及評核局專爲本科練習卷而編寫，供教師和學生參考之用。學生不應將評卷參考視爲標準答案，硬背死記，活剝生吞。這種學習態度，既無助學生改善學習，學懂應對及解難，亦有違考試着重理解能力與運用技巧之旨。

This marking scheme has been prepared by the Hong Kong Examinations and Assessment Authority for teachers' and students' reference. This marking scheme should NOT be regarded as a set of model answers. 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, will not help students to improve their learning nor develop their abilities in addressing and solving problems.

Hong Kong Diploma of Secondary Education Examination
Mathematics Compulsory Part Paper 1

General Marking Instructions

1. This marking scheme has been updated, with revisions made after the scrutiny of actual samples of student performance in the practice papers. Teachers are strongly advised to conduct their own internal standardisation procedures before applying the marking schemes. After standardisation, teachers should adhere to the marking scheme to ensure a uniform standard of marking within the school.

2. It is very important that all teachers should adhere as closely as possible to the marking scheme. In many cases, however, students 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. Teachers should be patient in marking alternative solutions not specified in the marking scheme.

3. 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).

4. For the convenience of teachers, the marking scheme was written as detailed as possible. However, it is still likely that students would not present their solution in the same explicit manner, e.g. some steps would either be omitted or stated implicitly. In such cases, teachers should exercise their discretion in marking students' work. In general, marks for a certain step should be awarded if students' solution indicated that the relevant concept/technique had been used.

5. Use of notation different from those in the marking scheme should not be penalized.

6. In marking students' work, the benefit of doubt should be given in the students' favour.

7. 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 in those steps where students could not score any marks.

8. 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. $\dfrac{(m^5n^{-2})^6}{m^4n^{-3}}$		
$=\dfrac{m^{30}n^{-12}}{m^4n^{-3}}$	1M	for $(ab)^p=a^pb^p$ or $(a^p)^q=a^{pq}$
$=\dfrac{m^{30-4}}{n^{12-3}}$	1M	for $\dfrac{a^p}{a^q}=a^{p-q}$ or $\dfrac{a^p}{a^q}=\dfrac{1}{a^{q-p}}$
$=\dfrac{m^{26}}{n^9}$	1A	
	----------(3)	
2. $\dfrac{5+b}{1-a}=3b$		
$5+b=3b(1-a)$	1M	for $3b(1-a)$
$5+b=3b-3ab$		
$3ab=2b-5$	1M	for putting a on one side
$a=\dfrac{2b-5}{3b}$	1A	or equivalent
$\dfrac{5+b}{1-a}=3b$		
$5+b=3b(1-a)$	1M	for $3b(1-a)$
$a=1-\dfrac{5+b}{3b}$	1M	for putting a on one side
$a=\dfrac{3b-(5+b)}{3b}$		
$a=\dfrac{2b-5}{3b}$	1A	or equivalent
	----------(3)	
3. (a) $9x^2-42xy+49y^2$		
$=(3x-7y)^2$	1A	or equivalent
(b) $9x^2-42xy+49y^2-6x+14y$		
$=(3x-7y)^2-6x+14y$	1M	for using (a)
$=(3x-7y)^2-2(3x-7y)$		
$=(3x-7y)(3x-7y-2)$	1A	or equivalent
	----------(3)	

Solution	Marks	Remarks
4. Let $\$x$ be the marked price of the chair.		pp–1 for undefined symbol
$x(1-20\%)=360(1+30\%)$	1M+1M+1A	1M for $x(1-20\%)$ + 1M for $360(1+30\%)$
$x=\dfrac{360(1.3)}{0.8}$		
$x=585$	1A	
Thus, the marked price of the chair is $\$585$.		u–1 for missing unit
The marked price of the chair $=\dfrac{360(1+30\%)}{1-20\%}$	1M+1M+1A	1M for $360(1+30\%)$ + 1M for dividing by $(1-20\%)$
$=\$585$	1A	u–1 for missing unit
	----------(4)	
5. Let x litres and y litres be the capacities of a bottle and a cup respectively.		pp–1 for undefined symbol
$\begin{cases}\dfrac{x}{y}=\dfrac{4}{3}\\ 7x+9y=11\end{cases}$	1A+1A	
So, we have $7x+9\left(\dfrac{3x}{4}\right)=11$.	1M	for getting a linear equation in x or y only
Solving, we have $x=\dfrac{4}{5}$.	1A	0.8
Thus, the capacity of a bottle is $\dfrac{4}{5}$ litre.		u–1 for missing unit
Let x litres be the capacity of a bottle.		pp–1 for undefined symbol
$7x+9\left(\dfrac{3x}{4}\right)=11$	1A+1M+1A	1A for $y=\dfrac{3x}{4}$ + 1M for $7x+9y=11$
Solving, we have $x=\dfrac{4}{5}$.	1A	0.8
Thus, the capacity of a bottle is $\dfrac{4}{5}$ litre.		u–1 for missing unit
	----------(4)	

Solution	Marks	Remarks
6. (a) $\angle AOC$	1M	for considering $\angle AOC$
$= 337^\circ - 157^\circ$		
$= 180^\circ$		
Thus, A , O and C are collinear.	1A	f.t.
(b) Note that $BO \perp AC$.		
The area of ΔABC		
$= \dfrac{1}{2}(13+15)(14)$	1M	
$= 196$	1A	
	----------(4)	
7. Note that $\angle BCD = 90^\circ$.	1A	
Also note that $\angle CBD = 180^\circ - 90^\circ - 36^\circ = 54^\circ$.		
Further note that $\angle BAC = \angle BDC = 36^\circ$.	1M	
Since $AB = AC$, we have $\angle ACB = \angle ABC$.		
So, we have $\angle ABC = \dfrac{180^\circ - 36^\circ}{2}$.	1M	
Therefore, we have $\angle ABC = 72^\circ$.		
$\angle ABD$		
$= \angle ABC - \angle CBD$		
$= 72^\circ - 54^\circ$		
$= 18^\circ$	1A	u−1 for missing unit
Note that $\angle BAC = \angle BDC = 36^\circ$.	1M	
Since $AB = AC$, we have $\angle ACB = \angle ABC$.		
So, we have $\angle ACB = \dfrac{180^\circ - 36^\circ}{2}$.	1M	
Therefore, we have $\angle ACB = 72^\circ$.		
Also note that $\angle BCD = 90^\circ$.	1A	
$\angle ACD$		
$= 90^\circ - 72^\circ$		
$= 18^\circ$		
$\angle ABD$		
$= \angle ACD$		
$= 18^\circ$	1A	u−1 for missing unit
	----------(4)	

Solution	Marks	Remarks
8. (a) The coordinates of A'		
$= (3, 4)$	1A	pp–1 for missing '(' or ')'
The coordinates of B'		
$= (5, -2)$	1A	pp–1 for missing '(' or ')'
(b) Let (x, y) be the coordinates of P.		
$\sqrt{(x-3)^2+(y-4)^2} = \sqrt{(x-5)^2+(y-(-2))^2}$	1M+1A	
$x^2-6x+9+y^2-8y+16 = x^2-10x+25+y^2+4y+4$		
$4x-12y-4=0$		
Thus, the required equation is $x-3y-1=0$.	1A	or equivalent
The coordinates of the mid-point of $A'B'$		
$=\left(\frac{3+5}{2}, \frac{4+(-2)}{2}\right)$	1M	
$=(4, 1)$		
The slope of $A'B'$		
$=\frac{4-(-2)}{3-5}$		
$=-3$	1A	
So, the required equation is $y-1=\frac{1}{3}(x-4)$.		
Thus, the required equation is $x-3y-1=0$.	1A	or equivalent
	----------(5)	
9. (a) The least possible value of the inter-quartile range of the distribution		
$=5-5$ or $2-2$	1M	either one
$=0$	1A	
The greatest possible value of the inter-quartile range of the distribution		
$=5-2$		either one
$=3$	1A	
(b) Since $r=9$ and the median of the distribution is 3 ,		
we have $9+8>12+s$.	1M	
Therefore, we have $s<5$.		
So, we have $s=1$, 2, 3 or 4 .		
Thus, there are 4 possible values of s .	1A	f.t.
	----------(5)	

Solution	Marks	Remarks
10. (a) Note that when $f(x)$ is divided by $x-1$, the remainder is 4.	1M	can be absorbed
$f(x)$		
$=(x-1)(6x^2+17x-2)+4$	1M	for $(x-1)(6x^2+17x-2)+r$
$=6x^3+11x^2-19x+6$		
$f(-3)$		
$=6(-3)^3+11(-3)^2-19(-3)+6$		
$=0$	1A	
	----------(3)	
(b) $f(x)$		
$=(x+3)(6x^2-7x+2)$	1M+1A	1M for $(x+3)(ax^2+bx+c)$
$=(x+3)(2x-1)(3x-2)$	1A	
	----------(3)	
11. (a) Let $C=a+bx^2$, where a and b are non-zero constants.	1A	
So, we have $a+(20^2)b=42$ and $a+(120^2)b=112$.	1M	for either substitution
Solving, we have $a=40$ and $b=\frac{1}{200}$.	1A	for both correct
The required cost		
$=40+\frac{1}{200}(50^2)$		
$=\$\,52.5$	1A	u–1 for missing unit
	----------(4)	
(b) $40+\frac{1}{200}x^2=58$	1M	
$x^2=3\,600$		
$x=60$	1A	u–1 for having unit
Thus, the required length is 60 cm .		
	----------(2)	

Solution	Marks	Remarks
12. (a) The required duration		
$= 63 - 32$	1M	
$= 31$ minutes	1A	u–1 for missing unit
	----------(2)	
(b) Suppose Ada and Billy meet at a place which is at a distance of x km from town P .		pp–1 for undefined symbol
$\frac{x}{78} = \frac{12}{120}$	1M+1A	1M for ratio $78:120$
$x = 7.8$	1A	
Thus, Ada and Billy meet at a place which is at a distance of 7.8 km from town P .		u–1 for missing unit
	----------(3)	
(c) The average speed of Ada		
$= \frac{12}{2}$	1M	either one
$= 6$ km/h		
The average speed of Billy		
$= \frac{16-2}{2}$		
$= 7$ km/h		
Note that $7 > 6$.		
Thus, Billy runs faster.	1A	f.t.
During the period, Ada runs 12 km while Billy runs 14 km .	1M	
Note that $14 > 12$.		
So, the average speed of Billy is higher than that of Ada.		
Thus, Billy runs faster.	1A	f.t.
	----------(2)	

Solution	Marks	Remarks
13. (a) Let n be the number of students in the group.		pp–1 for undefined symbol
$\frac{6}{n}=\frac{3}{20}$	1M	
$n=40$		
k		
$=40-6-11-5-10$	1M	
$=8$	1A	
	----------(3)	
(b) (i) The required angle		
$=\frac{5}{40}(360°)$	1M	
$=45°$	1A	u–1 for missing unit
(ii) Let m be the number of new students.		pp–1 for undefined symbol
Assume that the angle of the sector representing that the most favourite fruit is orange will be doubled.		
$\frac{5+m}{40+m}=\frac{(45)(2)}{360}$	1M	for considering $\frac{5+m}{n+m}$
$20+4m=40+m$		
$3m=20$		
Since 20 is not a multiple of 3, the angle of the sector representing that the most favourite fruit is orange will not be doubled.	1A	f.t.
	----------(4)	

Solution	Marks	Remarks
14. (a) $\Delta BCD \sim \Delta OAD$	2A	
	----------(2)	
(b) (i) Let $(0, h)$ be the coordinates of C.	1M	
By (a), we have $\left(\frac{CD}{AD}\right)^2 = \frac{16}{45}$.	1M	for using similarity
$\left(\frac{12-h}{\sqrt{6^2+12^2}}\right)^2 = \frac{16}{45}$	1M	for either AD or CD
$h^2 - 24h + 80 = 0$		
$h = 4$ or $h = 20$ (rejected)	1A	
Thus, the coordinates of C are $(0, 4)$.		pp–1 for missing '(' or ')'
(ii) Note that AC is a diameter of the circle $OABC$.	1M	
So, the coordinates of the centre of the circle are $(3, 2)$.	1M	either one
Also, the radius of the circle is $\sqrt{(3-0)^2 + (4-2)^2} = \sqrt{13}$.		
Thus, the equation of the circle $OABC$ is $(x-3)^2 + (y-2)^2 = 13$.	1A	$x^2 + y^2 - 6x - 4y = 0$
Suppose that the equation of the circle $OABC$ is $x^2 + y^2 + k_1x + k_2y + k_3 = 0$, where k_1, k_2 and k_3 are constants.	1M	
$\begin{cases} 0^2 + 0^2 + k_1(0) + k_2(0) + k_3 = 0 \\ 6^2 + 0^2 + k_1(6) + k_2(0) + k_3 = 0 \\ 0^2 + 4^2 + k_1(0) + k_2(4) + k_3 = 0 \end{cases}$		
Solving, we have $k_1 = -6$, $k_2 = -4$ and $k_3 = 0$.	1M	for solving system of equations
Thus, the equation of the circle $OABC$ is $x^2 + y^2 - 6x - 4y = 0$.	1A	
	----------(7)	

Solution	Marks	Remarks
15. (a) Let s be the standard deviation of the scores in the test.		
$\frac{36-48}{s}=-2$	1M	either one
$s=6$		
The standard score of John in the test		
$=\frac{66-48}{6}$		either one
$=3$	1A	
	----------(2)	
(b) Note that the score of David is equal to the mean of the scores.		
So, the mean of the scores remains unchanged.		
The sum of squares of the deviations of the scores in the test remains unchanged while the number of students decreases by 1 .		
Therefore, the standard deviation increases.	1M	
Hence, the standard score of John decreases.	1A	f.t.
Thus, the standard score of John will change.		
	----------(2)	

Solution	Marks	Remarks
16. (a) The required probability		
$=\dfrac{C_4^{18}}{C_4^{30}}$	1M	for numerator or denominator
$=\dfrac{68}{609}$	1A	r.t. 0.112
The required probability		
$=\left(\dfrac{18}{30}\right)\left(\dfrac{17}{29}\right)\left(\dfrac{16}{28}\right)\left(\dfrac{15}{27}\right)$	1M	for $\left(\frac{r}{n}\right)\left(\frac{r-1}{n-1}\right)\left(\frac{r-2}{n-2}\right)\left(\frac{r-3}{n-3}\right)$, $r<n$
$=\dfrac{68}{609}$	1A	r.t. 0.112
	----------(2)	
(b) The required probability		
$=1-\dfrac{68}{609}-\dfrac{C_4^{12}}{C_4^{30}}$	1M	for $1-(\text{a})-p_1$
$=\dfrac{530}{609}$	1A	r.t. 0.870
The required probability		
$=\dfrac{C_1^{18}C_3^{12}+C_2^{18}C_2^{12}+C_3^{18}C_1^{12}}{C_4^{30}}$	1M	for considering 3 cases
$=\dfrac{530}{609}$	1A	r.t. 0.870
The required probability		
$=1-\dfrac{68}{609}-\left(\dfrac{12}{30}\right)\left(\dfrac{11}{29}\right)\left(\dfrac{10}{28}\right)\left(\dfrac{9}{27}\right)$	1M	for $1-(\text{a})-p_2$
$=\dfrac{530}{609}$	1A	r.t. 0.870
The required probability		
$=4\left(\dfrac{18}{30}\right)\left(\dfrac{12}{29}\right)\left(\dfrac{11}{28}\right)\left(\dfrac{10}{27}\right)+6\left(\dfrac{18}{30}\right)\left(\dfrac{17}{29}\right)\left(\dfrac{12}{28}\right)\left(\dfrac{11}{27}\right)+4\left(\dfrac{18}{30}\right)\left(\dfrac{17}{29}\right)\left(\dfrac{16}{28}\right)\left(\dfrac{12}{27}\right)$	1M	for considering 14 cases
$=\dfrac{530}{609}$	1A	r.t. 0.870
	----------(2)	

Solution	Marks	Remarks
17. (a) $\dfrac{1}{1+2i}$		
$=\left(\dfrac{1}{1+2i}\right)\left(\dfrac{1-2i}{1-2i}\right)$	1M	
$=\dfrac{1}{5}-\dfrac{2}{5}i$	1A	
	----------(2)	
(b) (i) Note that $\dfrac{10}{1+2i}=2-4i$ and $\dfrac{10}{1-2i}=2+4i$.		
The sum of roots		
$=\dfrac{10}{1+2i}+\dfrac{10}{1-2i}$	1M	either
$=(2-4i)+(2+4i)$		
$=4$	1A	either
The product of roots		
$=\left(\dfrac{10}{1+2i}\right)\left(\dfrac{10}{1-2i}\right)$		
$=20$		
Thus, we have $p=-4$ and $q=20$.	1A	for both correct
(ii) When the equation $x^2-4x+20=r$ has real roots, we have $\Delta \geq 0$.		
So, we have $(-4)^2-4(1)(20-r)\geq 0$.	1M	
Thus, we have $r\geq 16$.	1A	
	----------(5)	

Solution	Marks	Remarks
18. (a) By cosine formula,		
$AB^2 = AC^2 + BC^2 - 2(AC)(BC)\cos\angle ACB$	1M	
$AB^2 = 20^2 + 12^2 - 2(20)(12)\cos 60^\circ$		
$AB = 4\sqrt{19}$ cm	1A	r.t. 17.4 cm $AB \approx 17.43559577$ cm
	----------(2)	
(b) By sine formula,		
$\frac{\sin\angle BAC}{BC} = \frac{\sin\angle ACB}{AB}$	1M	
$\frac{\sin\angle BAC}{12} = \frac{\sin 60^\circ}{4\sqrt{19}}$		
$\angle BAC \approx 36.58677555^\circ$		
Let Q be the foot of the perpendicular from C to AB.		
$\sin\angle BAC = \frac{CQ}{AC}$	1M	
$CQ \approx 20\sin 36.58677555^\circ$		
$CQ \approx 11.92079121$ cm		
Since $\Delta ABC \cong \Delta ABD$, the required angle is $\angle CQD$.	1M	for identifying the angle
$\sin\frac{\angle CQD}{2} = \frac{\frac{1}{2}CD}{CQ}$		
$\sin\frac{\angle CQD}{2} \approx 0.587209345$		
$\angle CQD \approx 71.91844786^\circ$		
$\angle CQD \approx 71.9^\circ$	1A	r.t. 71.9°
Thus, the angle between the plane ABC and the plane ABD is 71.9°.		
By sine formula,		
$\frac{\sin\angle ABC}{AC} = \frac{\sin\angle ACB}{AB}$	1M	
$\frac{\sin\angle ABC}{20} = \frac{\sin 60^\circ}{4\sqrt{19}}$		
$\angle ABC \approx 83.41322445^\circ$		
Let Q be the foot of the perpendicular from C to AB.		
$\sin\angle ABC = \frac{CQ}{BC}$	1M	
$CQ \approx 12\sin 83.41322445^\circ$		
$CQ \approx 11.92079121$ cm		
Since $\Delta ABC \cong \Delta ABD$, the required angle is $\angle CQD$.	1M	for identifying the angle
$\sin\frac{\angle CQD}{2} = \frac{\frac{1}{2}CD}{CQ}$		
$\sin\frac{\angle CQD}{2} \approx 0.587209345$		
$\angle CQD \approx 71.91844786^\circ$		
$\angle CQD \approx 71.9^\circ$	1A	r.t. 71.9°
Thus, the angle between the plane ABC and the plane ABD is 71.9°.		

Solution	Marks	Remarks
By sine formula,		
$\frac{\sin\angle BAC}{BC}=\frac{\sin\angle ACB}{AB}$	1M	
$\frac{\sin\angle BAC}{12}=\frac{\sin 60°}{4\sqrt{19}}$		
$\angle BAC\approx 36.58677555°$		
Let Q be the foot of the perpendicular from C to AB.		
$\sin\angle BAC=\frac{CQ}{AC}$	1M	
$CQ\approx 20\sin 36.58677555°$		
$CQ\approx 11.92079121\text{ cm}$		
By symmetry, we have $DQ=CQ$.		
$DQ\approx 11.92079121\text{ cm}$		
Since $\Delta ABC\cong\Delta ABD$, the required angle is $\angle CQD$.	1M	for identifying the angle
$CD^2=CQ^2+DQ^2-2(CQ)(DQ)\cos\angle CQD$		
$14^2\approx 11.92079121^2+11.92079121^2-2(11.92079121)(11.92079121)\cos\angle CQD$		
$\angle CQD\approx 71.91844786°$		
$\angle CQD\approx 71.9°$	1A	r.t. 71.9°
Thus, the angle between the plane ABC and the plane ABD is $71.9°$.		
The area of ΔABC		
$=\frac{1}{2}(AC)(BC)\sin\angle ACB$	1M	
$=\frac{1}{2}(20)(12)\sin 60°$		
$=60\sqrt{3}\text{ cm}^2$		
Let Q be the foot of the perpendicular from C to AB.		
$\frac{1}{2}(AB)(CQ)=60\sqrt{3}$		
$\frac{1}{2}(4\sqrt{19})(CQ)=60\sqrt{3}$	1M	
$CQ\approx 11.92079121\text{ cm}$		
Since $\Delta ABC\cong\Delta ABD$, the required angle is $\angle CQD$.	1M	for identifying the angle
$\sin\frac{\angle CQD}{2}=\frac{\frac{1}{2}CD}{CQ}$		
$\sin\frac{\angle CQD}{2}\approx 0.587209345$		
$\angle CQD\approx 71.91844786°$		
$\angle CQD\approx 71.9°$	1A	r.t. 71.9°
Thus, the angle between the plane ABC and the plane ABD is $71.9°$.		
	----------(4)	
(c) Let Q be the foot of the perpendicular from C to AB.		
Note that $\sin\frac{\angle CPD}{2}=\frac{\frac{1}{2}CD}{CP}$.		
Since $CP\geq CQ$, we have $\angle CPD\leq\angle CQD$.	1M	
Thus, $\angle CPD$ increases as P moves from A to Q and decreases as P moves from Q to B.	1A	f.t.
	----------(2)	

Solution	Marks	Remarks
19. (a) $4\,000\,000(1-r\%)^3 = 1\,048\,576$	1M	
$(1-r\%)^3 = \dfrac{1\,048\,576}{4\,000\,000}$		
$1-r\% = 0.64$		
$r = 36$	1A	
	----------(2)	
(b) (i) Let n be the number of years needed for the total revenue made by the firm to exceed $\$9\,000\,000$.		
$2000000 + 2000000(1-20\%) + \cdots + 2000000(1-20\%)^{n-1} > 9000000$	1M	for left side
$\dfrac{2\,000\,000(1-(0.8)^n)}{1-0.8} > 9\,000\,000$	1M	for sum of geometric sequence
$(0.8)^n < 0.1$		
$n \log 0.8 < \log 0.1$		
$n > \dfrac{\log 0.1}{\log 0.8}$	1M	for solving inequality
$n > 10.31885116$		
Thus, the least number of years needed is 11 .	1A	
(ii) The total revenue made by the firm		
$< 2000000 + 2000000(1-20\%) + 2000000(1-20\%)^2 + \cdots$		
$= \dfrac{2\,000\,000}{1-0.8}$	1M	
$= 10\,000\,000$	1A	f.t.
Thus, the total revenue made by the firm will not exceed $\$10\,000\,000$.		
(iii) The total revenue made by the firm minus the total amount of investment in the first m years		
$= \dfrac{2\,000\,000(1-(0.8)^m)}{1-0.8} - \dfrac{4\,000\,000(1-(0.64)^m)}{1-0.64}$	1M	
$= 10\,000\,000\left((1-(0.8)^m) - \dfrac{10}{9}(1-(0.64)^m)\right)$		
$= 10\,000\,000\left((1-(0.8)^m) - \dfrac{10}{9}(1-(0.8)^{2m})\right)$		
$= \dfrac{10\,000\,000}{9}\left(10((0.8)^m)^2 - 9(0.8)^m - 1\right)$	1M	for quadratic expression
$= \dfrac{10\,000\,000}{9}\left(10(0.8)^m + 1\right)\left((0.8)^m - 1\right)$		
Note that $(0.8)^m > 0$ and $(0.8)^m < 1$ for any positive integer m .	1M	for either one
Therefore, we have $10(0.8)^m + 1 > 0$ and $(0.8)^m - 1 < 0$.		
So, we have $\dfrac{2\,000\,000(1-(0.8)^m)}{1-0.8} - \dfrac{4\,000\,000(1-(0.64)^m)}{1-0.64} < 0$.		
Thus, the claim is disagreed.	1A	f.t.
	---------(10)	

HONG KONG EXAMINATIONS AND ASSESSMENT AUTHORITY

HONG KONG DIPLOMA OF SECONDARY EDUCATION EXAMINATION

PRACTICE PAPER

MATHEMATICS COMPULSORY PART PAPER 2

Question No.	Key	Question No.	Key
1.	A	31.	D
2.	C	32.	B
3.	A	33.	C
4.	D	34.	D
5.	D	35.	A
6.	C	36.	B
7.	B	37.	A
8.	D	38.	C
9.	A	39.	A
10.	B	40.	C
11.	D	41.	B
12.	A	42.	A
13.	A	43.	B
14.	B	44.	D
15.	C	45.	C
16.	D		
17.	C		
18.	A		
19.	D		
20.	C		
21.	C		
22.	B		
23.	C		
24.	D		
25.	B		
26.	D		
27.	B		
28.	A		
29.	B		
30.	C		