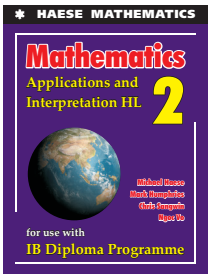


ERRATA

Mathematics: Applications and Interpretation HL

First edition - 2021 second reprint

The following errata were made on 17/Mar/2025

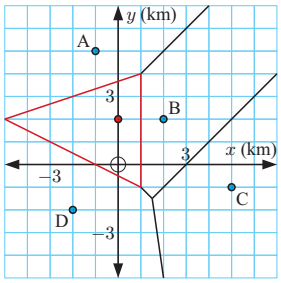
page 646 **EXERCISE 25A** Question **5**, third line should read:

5 Newton's law of universal gravitation states that the force of attraction between two objects with masses m_1 and m_2 a distance r apart is given by $F = \dfrac{Gm_1m_2}{r^2}$ where $G \approx 6.6743 \times 10^{-11}$ m^3 kg^{-1} s^{-2}.
Consider a small satellite with mass m_S which is at altitude x above the Earth's surface.
The Earth has mass $m_E \approx 5.9722 \times 10^{24}$ kg and radius $r_E \approx 6.378 \times 10^6$ m.

page 917 **ANSWERS EXERCISE 16C** Questions **6 b i** and **iii**, should read:

6 **a** **i** polling booth A **ii** polling booth D

b **i**



ii cell C

iii 15 km^2

page 947 **ANSWERS EXERCISE 25A** Question **5 b**, should read:

5 **b** $g \approx 9.80$ m s^{-2}

The following errata were made on 28/Oct/2024

page 348 **CHAPTER 13 ACTIVITY 2**, third paragraph should read:

The transition matrix for a model of this form is called a **Leslie matrix**, named after its inventor, the Scottish physiologist and statistician, **Patrick Leslie** (1900 - 1972).

page 366 **CHAPTER 14 INVESTIGATION 3** Question **6**, should read:

6 Consider an anticlockwise rotation about the origin through angle θ.
Suppose an object point is located by a position vector which is an eigenvector $\mathbf{v}$ of the transformation matrix $\mathbf{A} = \begin{pmatrix} \cos\theta & -\sin\theta \\ \sin\theta & \cos\theta \end{pmatrix}$.

The following errata were made on 10/May/2022

page 290 **CHAPTER 11 HISTORICAL NOTE**, second paragraph should read:

HISTORICAL NOTE — EULER'S BEAUTIFUL EQUATION

One of the most remarkable results in mathematics is known as **Euler's beautiful equation** $e^{i\pi} = -1$ named after **Leonhard Euler**.

It is called beautiful because it links together three great constants of mathematics: Euler's number e, the imaginary number i, and the ratio of a circle's circumference to its diameter, which is π.

Harvard lecturer **Benjamin Pierce** said of $e^{i\pi} = -1$,

> "Gentlemen, that is surely true, it is absolutely paradoxical; we cannot understand it, and we don't know what it means, but we have proved it, and therefore we know it must be the truth."

page 360 **CHAPTER 14** Example 5, fifth last line of solution should read:

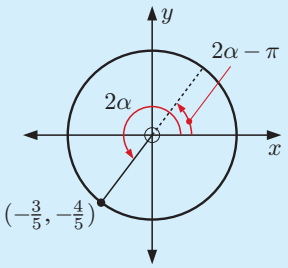
Example 5 — Self Tutor

Find the nature of the transformation with equations: $\begin{cases} x' = \dfrac{-3x - 4y}{5} \\ y' = \dfrac{-4x + 3y}{5} \end{cases}$

$\mathbf{A} = \begin{pmatrix} -\frac{3}{5} & -\frac{4}{5} \\ -\frac{4}{5} & \frac{3}{5} \end{pmatrix}$ where $|\mathbf{A}| = -\left(\frac{3}{5}\right)^2 - \left(-\frac{4}{5}\right)^2 = -1$.

Since $\mathbf{A}$ has the form $\begin{pmatrix} a & b \\ b & -a \end{pmatrix}$ and $|\mathbf{A}| = -1$,

$\mathbf{A}$ is a reflection matrix where $\cos 2\alpha = -\frac{3}{5}$ and $\sin 2\alpha = -\frac{4}{5}$.

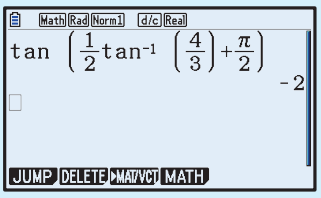


$\therefore \tan 2\alpha = \frac{4}{3}, \quad \pi < 2\alpha < \frac{3\pi}{2}$

$\therefore \tan(2\alpha - \pi) = \frac{4}{3}, \quad 0 < 2\alpha - \pi < \frac{\pi}{2}$

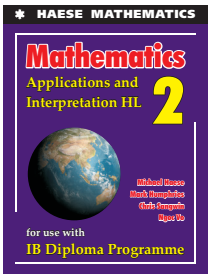
$\therefore 2\alpha - \pi = \tan^{-1}\left(\frac{4}{3}\right)$

$\therefore \alpha = \frac{1}{2}\tan^{-1}\left(\frac{4}{3}\right) + \frac{\pi}{2}$



$\therefore \tan\alpha = -2$

$\therefore$ the transformation is a reflection in the line $y = -2x$.



ERRATA

Mathematics: Applications and Interpretation HL

First edition - 2020 first reprint

The following erratum was made on 18/Aug/2021

page 650 **CHAPTER 25** Example 5, last line of question should read:

Example 5 **Self Tutor**

The marginal cost of producing x urns per week is given by

$\frac{dC}{dx} = 2.15 - 0.02x + 0.000\,36x^2$ pounds per urn provided $0 \leqslant x \leqslant 120$.

The initial costs before production starts are £185.

Find the total cost of producing 100 urns per week.

....

The following erratum was made on 13/Apr/2021

page 898 **ANSWERS EXERCISE 12F.3** Question **4 c**, should read:

4 **a** $A^2 = \begin{pmatrix} \frac{1}{2} & \frac{1}{2} \\ \frac{1}{2} & \frac{1}{2} \end{pmatrix}$ **b** false as $A(A - I) = O$ does not imply that $A = O$ or $A - I = O$

c $\begin{pmatrix} 0 & 0 \\ 0 & 0 \end{pmatrix}$, $\begin{pmatrix} 1 & 0 \\ 0 & 1 \end{pmatrix}$, $\begin{pmatrix} 0 & 0 \\ c & 1 \end{pmatrix}$, $\begin{pmatrix} 1 & 0 \\ c & 0 \end{pmatrix}$ $(c \in \mathbb{R})$,

$\begin{pmatrix} a & b \\ \frac{a - a^2}{b} & 1 - a \end{pmatrix}$ $(b \neq 0)$

The following errata were made on 04/Mar/2021

page 385 **CHAPTER 15** Section D, first blue box should read:

An **adjacency matrix** is a matrix which shows how the vertices of a network are connected.

page 434 **CHAPTER 16** Example 5, question should read:

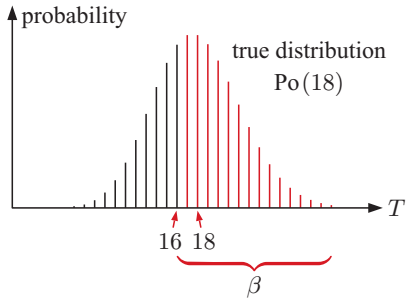
Redraw this Voronoi diagram with an additional site at E(−2, 1).

The following errata were made on 27/Jan/2021

page 822 **CHAPTER 30** Example 14, diagram of solution to part **c** should have 16 column coloured black:

c A Type II error is accepting H_0 when H_0 is in fact false. This means accepting $\lambda = 2$ when in fact $\lambda = 1.5$.

$$\begin{aligned} &\text{P(Type II error)} \\ &= \text{P(Retain } H_0 \mid H_0 \text{ false)} \\ &= \text{P}(T > 16 \mid T \sim \text{Po}(18)) \\ &\approx 0.625 \end{aligned}$$



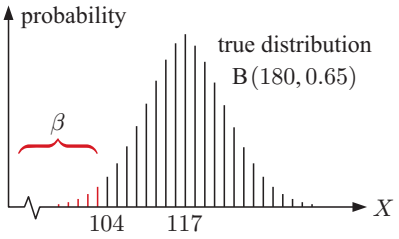
page 823 **CHAPTER 30** Example 15, diagram of solution to part **c** should have 104 label in correct position:

c A Type II error means deciding the coin is fair when it is in fact biased.

If $p = 0.65$, then $X \sim \text{B}(180, 0.65)$.

$$\begin{aligned} \therefore\ \beta &= \text{P(Type II error)} \\ &= \text{P(Retain } H_0 \mid H_0 \text{ false)} \\ &= \text{P}(X < 104 \mid X \sim \text{B}(180, 0.65)) \\ &\approx 0.0184 \end{aligned}$$

$\therefore$ the power of the test $= 1 - \beta \approx 0.9816$



The following errata were made on 11/Dec/2020

page 246 **CHAPTER 10** Example 4, last line of solution should read:

Since $\mathbf{b}_2 = -2\mathbf{b}_1$, the lines are parallel. The angle between them is $0°$.

page 347 **EXERCISE 13D.2** Question **5 c**, should read:

5 **c** In 2019, 26% of the birds lived on Paua, 39% lived on Manu, and 35% lived on Chalk. Estimate the proportions on each island in:

i 2020 **ii** 2022.

page 362 **EXERCISE 14E** Question **3**, should read:

3 **a** Find the image $\mathbf{x}'$ when $\mathbf{x} = \begin{pmatrix} x \\ y \end{pmatrix}$ is stretched horizontally with scale factor k.

b Find the image $\mathbf{x}''$ when $\mathbf{x}'$ is stretched vertically with scale factor k.

c Explain your answer by considering the product $\begin{pmatrix} 1 & 0 \\ 0 & k \end{pmatrix}\begin{pmatrix} k & 0 \\ 0 & 1 \end{pmatrix}$.

page 401 **CHAPTER 15 ACTIVITY 2** Question **1**, should read:

What to do:

1 Can a tour be made of the town which crosses each bridge exactly once?

page 633 **EXERCISE 24F** Question **10 e**, should read:

10 **e** Find Kristen's initial speed in m s^{-1}, correct to 2 decimal places.

page 646 **EXERCISE 25A** Question **5 a**, should read:

5 Newton's law of universal gravitation states that the force of attraction between two objects with masses m_1 and m_2 a distance r apart is given by $F = \dfrac{Gm_1m_2}{r^2}$ where $G \approx 6.7743 \times 10^{-11}$ $\text{m}^3\,\text{kg}^{-1}\,\text{s}^{-2}$.

Consider a small satellite with mass m_S which is at altitude x above the Earth's surface.

The Earth has mass $m_E \approx 5.9722 \times 10^{24}$ kg and radius $r_E \approx 6.378 \times 10^6$ m.

a Use the law of universal gravitation and Newton's second law to show that the acceleration of the satellite due to gravity is $\ddot{x} = \dfrac{Gm_E}{(x + r_E)^2}$.

b *Hence* estimate g, the acceleration due to gravity for an object at low altitude.

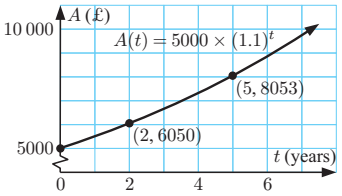
page 852 **REVIEW SET 31A** Question **6**, table should read:

6 A survey was conducted to determine whether the use of social media is linked to the amount of exercise a person gets. The table below summarises the results from a survey.
Test at a 5% level of significance whether the variables are related.

		Social media (y hours per week)			
		$y < 2$	$2 \leqslant y < 6$	$6 \leqslant y < 10$	$y \geqslant 10$
Exercise (x hours per week)	$x < 2$	5	13	11	21
	$2 \leqslant x < 4$	16	22	18	14
	$4 \leqslant x < 6$	20	26	16	9
	$x \geqslant 6$	15	8	11	3

page 859 **ANSWERS EXERCISE 1G.1** Question **7 c**, replace graph with:

7 **c**



d ≈ 4.93 years

page 891 **ANSWERS EXERCISE 10E** Question **3 c ii**, should read:

3 **a** truck A: $\begin{pmatrix} -72 \\ 54 \end{pmatrix}$, truck B: $\begin{pmatrix} -75 \\ 40 \end{pmatrix}$

b truck A: 1:30 pm, truck B: 2:00 pm

c **i** $\approx$ 12:41 pm **ii** ≈ 40.9 km

page 891 **ANSWERS EXERCISE 10F.1** Question **6 d**, should read:

6 **a** Jove **b** $\begin{pmatrix} x \\ y \end{pmatrix} = \begin{pmatrix} -4 \\ -1 \end{pmatrix} + t \begin{pmatrix} \frac{3}{2} \\ -2 \end{pmatrix}$ **c** $(-1, -5)$

d No; Jove passes through the intersection point after 2 seconds, and Fiona passes through it after 6 seconds.

page 895 **ANSWERS EXERCISE 11I** Question **11**, should read:

11 $A = \dfrac{\sin\frac{\pi}{5} + \cos\frac{\pi}{5}}{\sin\frac{\pi}{7} + \cos\frac{\pi}{7}}$, $B = \dfrac{\sin\frac{\pi}{7}\cos\frac{\pi}{5} - \cos\frac{\pi}{7}\sin\frac{\pi}{5}}{\sin\frac{\pi}{7} + \cos\frac{\pi}{7}}$

page 900 **ANSWERS EXERCISE 13A.2** Question **5 a**, should read:

5 **a** Eigenvalues are 3 and -2.

For $\lambda = 3$, $\mathbf{x} = \begin{pmatrix} 1 \\ -4 \end{pmatrix} t$, $t \neq 0$.

For $\lambda = -2$, $\mathbf{x} = \begin{pmatrix} 1 \\ 1 \end{pmatrix} t$, $t \neq 0$.

page 902 **ANSWERS REVIEW SET 13A** Question **1 a**, should read:

1 **a** $\lambda^2 + \lambda - 4$ **b** $-\frac{1}{2} \pm \frac{\sqrt{17}}{2}$

page 903 **ANSWERS REVIEW SET 13B** Question **6 b**, should read:

6 **a** $\lambda_1 = 5$, $\mathbf{x}_1 = \begin{pmatrix} -1 \\ 5 \end{pmatrix}$, $\lambda_2 = 4$, $\mathbf{x}_2 = \begin{pmatrix} 0 \\ 1 \end{pmatrix}$

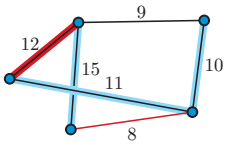
b $\mathbf{P} = \begin{pmatrix} -1 & 0 \\ 5 & 1 \end{pmatrix}$, $\mathbf{P}^{-1}\mathbf{B}\mathbf{P} = \begin{pmatrix} 5 & 0 \\ 0 & 4 \end{pmatrix}$

c **i** $\mathbf{B}^3 = \begin{pmatrix} 5^3 & 0 \\ -5^4 + 5 \times 4^3 & 4^3 \end{pmatrix} = \begin{pmatrix} 125 & 0 \\ -305 & 64 \end{pmatrix}$

ii $\mathbf{B}^6 = \begin{pmatrix} 5^6 & 0 \\ -5^7 + 5 \times 4^6 & 4^6 \end{pmatrix} = \begin{pmatrix} 15\,625 & 0 \\ -57\,645 & 4096 \end{pmatrix}$

page 910 **ANSWERS EXERCISE 15F** Question **4** diagram in first column and third row, should be:

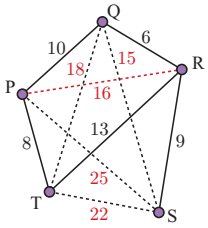
4



weight: 48

page 913 **ANSWERS EXERCISE 15K.2** Question **1 a**, diagram should be:

1 **a**



b P → T → R → Q → S → P,
upper bound is 67

c lower bound is 46

page 934 **ANSWERS EXERCISE 20C** Questions **2 b** and **3 e ii**, should read:

2 **a** $C(x) \approx -0.178x^3 + 15.3x^2 + 3280x + 24\,500$

b €331 000

3 **a** $P(0) = 21.5 \quad \therefore \quad d = 21.5$

b $P'(t) = 3at^2 + 2bt + c$ **c** $t = 15$

d $3375a + 225b + 15c = 5$
$125\,000a + 2500b + 50c = -13.9$
$675a + 30b + c = 0$
$\therefore \quad P(t) \approx 0.000\,136t^3 - 0.0263t^2 + 0.697t + 21.5$

e **i** ≈ 22.4 million **ii** ≈ -1.98 million

f The model provided a reasonable estimate when interpolating between data points. The extrapolation in **e ii** however predicted a negative population, which is not possible.

page 943 **ANSWERS EXERCISE 24C** Question **5 c**, should read:

5 **b** $\dot{x}(t) = 1 - \dfrac{2}{2t+1}$ cm s^{-1}

c **i** $t > \frac{1}{2}$ **ii** $0 \leqslant t < \frac{1}{2}$ **d** $\ddot{x}(t) = \dfrac{4}{(2t+1)^2}$

f $\frac{4}{25}$ cm s^{-2} **g** $1 + \ln\left(\frac{4}{5}\right) \approx 0.777$ cm

page 945 **ANSWERS EXERCISE 24E** Question **5 b ii**, should read:

5 **b** **ii** The particle initially moves to the left, and while $3 < s < 5$, $v < 0$ and $a > 0$. As time progresses, the particle approaches $s = 3$, and v and a approach 0.

page 945 **ANSWERS EXERCISE 24F** Question **2 a**, should read:

2 **a** $(11, -10)$ **b** $\begin{pmatrix} \dfrac{3}{\sqrt{t+1}} \\ 4 \end{pmatrix}$ **c** 5 m s^{-1}

d The truck decreases to a speed of 4 m s^{-1}. **e** $t = \frac{19}{17}$ s

page 948 **ANSWERS EXERCISE 25D** Question **4 d**, should read:

4 **a** $y = \sqrt[3]{\frac{9}{2}x^2 + 1}$ **b** $y = \frac{1}{36}(x - 26)^2$

c $y = e^{x + \frac{1}{3}x^3}$ **d** $y = \sin^{-1}\left(\frac{3}{2}x^2 - \frac{3}{2}\right)$

e $y = \left(\frac{9}{2}\sin 2x + 3\sqrt{3}\right)^{\frac{2}{3}}$

page 949 **ANSWERS REVIEW SET 25B** Question **6 a**, should read:

6 **a** $y = (\frac{1}{2}x + 2)^2$ **b** $y = e^{\sin x - 3}$

page 953 **ANSWERS REVIEW SET 26B** Question **4 d**, should read:

4 **d** $(0.06,\ 6)$

page 954 **ANSWERS EXERCISE 27D** Question **8 a i**, should read:

8 **a** **i** Y would have the greater mean as, on average, we are more likely to obtain higher values from the maximum of two rolls than from a single roll.

page 956 **ANSWERS REVIEW SET 27A** Question **14 a**, should read:

14 **a** ≈ 0.824 **b** ≈ 0.0293 **c** ≈ 0.450

page 959 **ANSWERS EXERCISE 29A** Question **4 b**, should read:

4 **a** As $\sum P(x) = 1$ in each distribution, each is a well defined probability distribution.

b **i** $\text{E}(X) = 2.5, \quad \sigma(X) = \sqrt{5.25} \approx 2.29$

ii $\text{E}(Y) = 2.2, \quad \sigma(Y) = \sqrt{9.16} \approx 3.03$

c $-\$0.30$ or -30 cents

d No; the expected gain from playing this game is negative.

page 960 **ANSWERS EXERCISE 29C** Question **5 a**, should read:

5 **a** $\approx 0.004\,00$ **b** $\approx 0.001\,10$

page 960 **ANSWERS REVIEW SET 29A** Question **9 a**, should read:

9 **a** $s^2 \approx 16.4$ **b** **i** $124.75 \leqslant \mu \leqslant 129.24$ **ii** $k \approx 93.0$

page 961 **ANSWERS REVIEW SET 29B** Question **9 c**, should read:

9 **a** ≈ 0.0515 **b** ≈ 0.0299 **c** 601.3 mL

page 963 **ANSWERS REVIEW SET 30A** Question **13 c**, should read:

13 **a** **i** $\{x \mid x \geqslant 13\}$ **ii** $\{x \mid x \leqslant 12\}$

b ≈ 0.0253 or $\approx 2.53\%$ **c** ≈ 0.0898

page 964 **ANSWERS EXERCISE 31B** Question **2 b**, should read:

2 **a** ≈ 0.885 accidents per week

b $\chi^2_{\text{calc}} \approx 11.5, \quad \text{df} = 2, \quad p\text{-value} \approx 0.003\,25$

Since p-value < 0.05, we conclude that the data does not come from a Poisson distribution at a 5% significance level.

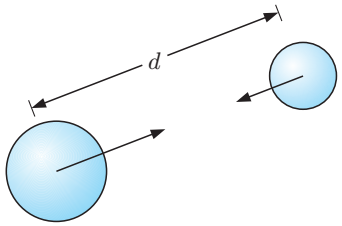
page 965 **ANSWERS EXERCISE 31B** Question **4 e**, should read:

4 **e** $\chi^2_{\text{calc}} \approx 9.37$, df $= 4$, p-value ≈ 0.0248
Since p-value > 0.01, there is insufficient evidence to reject H_0 at a 1% level of significance. We conclude that the data is normally distributed.

The following errata were made on 06/Oct/2020

page 192 **REVIEW SET 8B** Question **6**, table should read:

6 Gravity is the force of attraction which exists between any two objects in the universe. The force of attraction F between two spherical masses at various distances d apart is shown below:



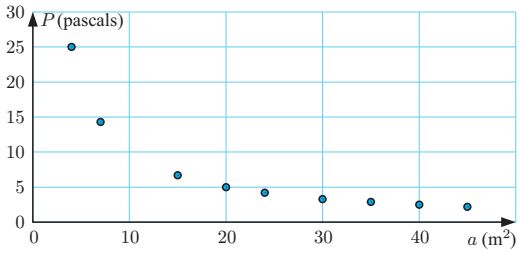
d (cm)	24	26	28	30	32	34	36	38	40
F (newtons)	0.237	0.202	0.174	0.152	0.133	0.118	0.105	0.095	0.085

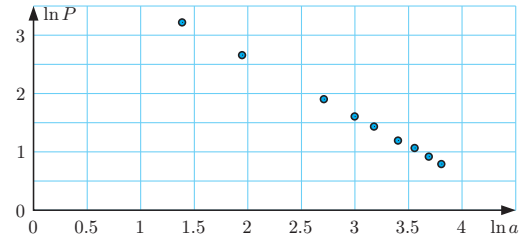
page 878 **ANSWERS REVIEW SET 7B** Question **8 e**, should read:

8 **e** $r^2 \approx 0.346$; approximately 34.6% of the variation in *sales* can be explained by the variation in *price*.
So, the linear model does not fit the data very well.

page 879 **ANSWERS EXERCISE 8C** Question **3**, both graphs should belong to part **a**:

3 **a**





b The scatter diagram of $\ln P$ against $\ln a$ appears to be linear, so a power model is appropriate.

page 883 **ANSWERS REVIEW SET 8B** Questions **4 b** and **6**, should read:

4 **a** The scatter diagram of b against $\ln P$ appears to be linear.
b $b \approx 9.03 - 0.441 \ln P$ **c** ≈ 31.8 torr

6 **a** $F \approx 138 \times d^{-2.00}$, the graph of $\ln F$ against $\ln d$ appears to be linear.
b **i** ≈ 0.162 newtons **ii** ≈ 0.342 newtons
iii $\approx 5.39 \times 10^{-6}$ newtons

page 894 **ANSWERS EXERCISE 11H.1** Question **5 b i**, should read:

5 **a** $z_1 = 4 \operatorname{cis} \frac{2\pi}{3}$
b **i** $z_2 = 8 \operatorname{cis}\left(-\frac{5\pi}{6}\right)$ **ii** $z_2 = -4\sqrt{3} - 4i$

The following errata were made on 21/Sep/2020

page 864 **ANSWERS EXERCISE 2E** Question **3 d**, should read:

3 **d** Our scale in **c** is obtained by translating the scale in **a** ≈ 6.77 units left. This occurs since $\log\left(\frac{P}{P_S}\right) = \log P - \log P_S$.

page 865 **ANSWERS EXERCISE 3B** Question **13 b**, should read:

13 **a** ≈ 4.40 hours $(\approx 4$ h 24 min 5 s) **b** $\approx 0.289\%$

page 866 **ANSWERS REVIEW SET 3B** Questions **1 b** and **3**, should read:

1 **a** $14.85 \text{ s} < t < 14.95 \text{ s}$ **b** $6.69 \text{ m s}^{-1} < s < 6.73 \text{ m s}^{-1}$

2 $267.5 \text{ cm}^2 < A < 355.5 \text{ cm}^2$ **3** $59.6 \text{ km} < D < 60.2 \text{ km}$

page 897 **ANSWERS EXERCISE 12A** Question **5**, should read:

5

pies	pasties	rolls	buns	
40	50	55	40	Friday
25	65	44	30	Saturday
35	40	40	35	Sunday
35	40	35	50	Monday

(in dozens)

The following errata were made on 08/Sep/2020

page 60 **CHAPTER 2 INVESTIGATION 2** Question **1**, should read:

What to do:

1 Print the graph. Mark, as accurately as possible, the values on the x-axis corresponding to y being 1, 2, 3, 4, ..., 9, and 10, 20, 30, 40, ..., 90.

page 75 **REVIEW SET 3A** Question **3**, should read:

3 A triangular garden is measured to have sides of length 9 m, 12 m, and 14 m, rounded to the nearest metre. Find the range of possible values for the area A of the garden.

page 187 **CHAPTER 8 ACTIVITY 3** Question **1 c**, should read:

What to do:

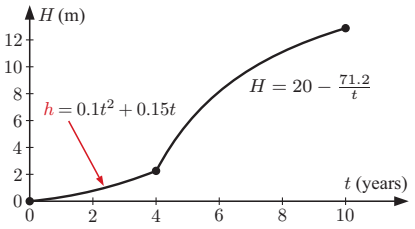
1 **c** How can the *precision* of the estimate be improved in the spreadsheet?

page 865 **ANSWERS REVIEW SET 3A** Question **3**, should read:

2 $48\text{ cm} < P < 52\text{ cm}$ **3** $48.6\text{ m}^2 < A < 58.7\text{ m}^2$

page 932 **ANSWERS EXERCISE 20A** Question **4 c**, diagram should have correct label:

4 **c**



The following errata were made on 18/Aug/2020

page 132 **REVIEW SET 6A** Question **10**, first sentence should read:

10 Kelly makes glass regular pyramids of height h cm with equal edge lengths. She suspects that the volume of glass V cm^3 she uses is directly proportional to a power of h, so $V \propto h^n$. A table of volumes for various heights is shown below.

page 919 **ANSWERS REVIEW SET 16B** Question **4 a**, should read:

4 **a** There is a cell with no corresponding site. **b** $(3, 1)$

The following erratum was made on 27/Jul/2020

page 872 **ANSWERS REVIEW SET 6A** Question **10 a**, replace with:

10 **a** If the height of a regular pyramid increases, then each side length also increases.
This means the pyramid gets larger in all 3 dimensions as the height increases, so we should expect that V is directly proportional to h^3.

b $V = \frac{2}{5}h^3$ **c** $\frac{2}{5} \times 4^3 = 25.6$ ✓ $\frac{2}{5} \times 6^3 = 86.4$ ✓

d **i** $V = 204.8$ **ii** $h = 5$

The following erratum was made on 16/Jul/2020

page 932 **ANSWERS EXERCISE 20A** Question **4 b iii**, should read:

4 **a** **i** $\frac{dh}{dt} = 0.2t + 0.15$ metres per year

ii 0.35 m per year **iii** after 3 years **iv** 2.2 m

b **i** $k = 71.2$ **ii** $\frac{dH}{dt} = \frac{71.2}{t^2}$

iii Yes, since $\frac{dh}{dt} \neq \frac{dH}{dt}$ when $t = 4$.

The following erratum was made on 17/Jun/2020

page 35 **CHAPTER 1 INVESTIGATION 2** Question **5**, should read:

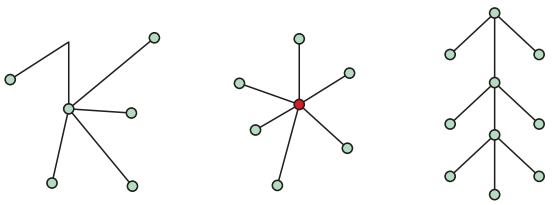
5 For continuous growth, $u_n = u_0 e^{rt}$ where u_0 is the initial amount, r is the annual percentage rate, and t is the number of years.

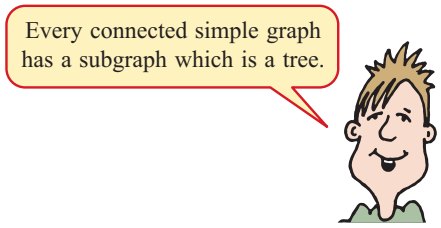
Use this formula to find the final amount if \$1000 is invested for 1 year at a fixed rate of 6% per annum, where the interest is paid continuously.

The following erratum was made on 27/May/2020

page 394 **SECTION 18F** Second example of trees should include vertex shown:

Some examples of trees are shown below:





The following erratum was made on 13/May/2020

page 931 **ANSWERS REVIEW SET 19B** Question **18 b**, should read:

18 **a** $0 \leqslant x \leqslant \frac{\pi}{2}$ and $\frac{3\pi}{2} \leqslant x \leqslant 2\pi$

b $f'(x) = -\dfrac{\sin x}{2\sqrt{\cos x}}$, increasing for $\frac{3\pi}{2} \leqslant x \leqslant 2\pi$,
decreasing for $0 \leqslant x \leqslant \frac{\pi}{2}$

The following erratum was made on 27/Apr/2020

page 948 **ANSWERS EXERCISE 25D** Question **2 f**, should read:

2 **a** $y = Ae^x$ **b** $y = \pm\sqrt{2x + c}$

c $y = Ae^t + 4$ **d** $P = \left(\frac{3}{2}t + c\right)^2$

e $Q = Ae^{2t} - \frac{3}{2}$ **f** $Q = -\frac{3}{2} \pm \sqrt{t + c}$

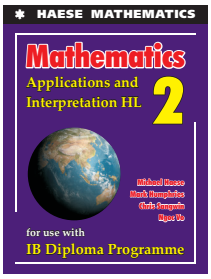
The following erratum was made on 24/Apr/2020

page 959 **ANSWERS EXERCISE 29A** Question **2**, should read:

2 **a** $\mathrm{E}(X + 2Y) = 15.2$, $\sigma(X + 2Y) \approx 2.07$

b $\mathrm{E}(Y - X) = 1.9$, $\sigma(Y - X) \approx 1.07$

c $\mathrm{E}(3X - 2Y) = 0$, $\sigma(3X - 2Y) \approx 2.26$



ERRATA

Mathematics: Applications and Interpretation HL

First edition - 2019 initial print

The following errata were made on 24/Apr/2020

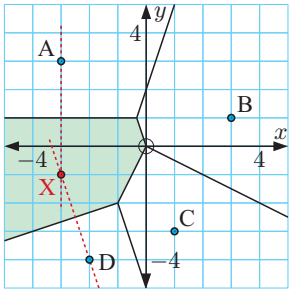
page 432 **SECTION 16B** Example 4, last line of solution should read:

The missing site X must lie in the shaded cell, as this cell currently has no site.

Now PB(A, X) is horizontal, and PB(D, X) has gradient $\frac{1}{3}$.

$\therefore$ [AX] is vertical and [DX] has gradient -3.

If we draw lines (AX) and (DX) through A and D respectively, their intersection must be point X. We observe that X has coordinates $(-3,\ -1)$.



page 519 **REVIEW SET 19A** Question **4** is a duplicate of RS 18A Q7 p492, replace with:

4 Find all points on the curve $y = 4x^3 + 6x^2 - 13x + 1$ where the gradient of the tangent is 11.

page 718 **CHAPTER 27 INVESTIGATION 2** Question **1**, change for simplicity:

What to do:

1 Click on the icon to access the demonstration. It shows the graph of the binomial distribution for $X \sim \text{B}(n,\ p)$. Set $n = 25$ and $p = 0.1$.

a What is the mode of X?

b Describe the shape of the distribution.

page 724 **SECTION 27I**, first line on page should read:

In factorial notation we use $x!$ to denote the product of the first x integers $x \times (x-1)\ldots. \times 3 \times 2 \times 1$. We also define $0! = 1$.

page 789 **SECTION 30B**, bottom blue box *Step 5* should read:

Step 5: Reject H_0 if p-value $\leqslant \alpha$, otherwise accept H_0.

page 798 **SECTION 30D**, blue box *Step 5* should read:

Step 5: Reject H_0 if p-value $\leqslant \alpha$ or if $t \in \mathcal{C}$, otherwise accept H_0.

page 805 **SECTION 30G POISSON RANDOM SAMPLES**, should read:

POISSON RANDOM SAMPLES

Suppose the population has a Poisson distribution with an unknown mean λ. We want to test the null hypothesis H_0: $\lambda = \lambda_0$.

Consider a random sample of n independent and identically distributed observations from this population, $\{X_1, ..., X_n\}$.

We have already seen that an estimator for the population mean is the sample mean $\overline{X}_n = \frac{1}{n}\sum_{i=1}^{n} X_i$.

We will therefore consider $n\overline{X}_n = \sum_{i=1}^{n} X_i$ when we choose our test statistic.

page 806 **SECTION 30G**, bottom blue box *Step 5* should read:

Step 5: Reject H_0 if p-value $\leqslant \alpha$, otherwise accept H_0.

page 810 **SECTION 30H**, blue box *Step 5* should read:

Step 5: Reject H_0 if p-value $\leqslant \alpha$, otherwise accept H_0.

page 846 **SECTION 31D**, blue box *Step 6* should read:

Step 6: Reject H_0 if p-value $\leqslant \alpha$ *or* if $\chi^2_{\text{calc}} \geqslant \chi^2_{\text{crit}}$, otherwise accept H_0.

page 815 **SECTION 30I** Example 11, last lines of solution should read:

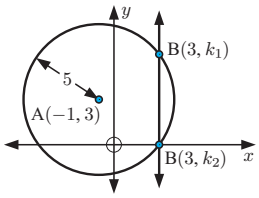
Step 5: Since p-value $> 0.05 = \alpha$, we do not have enough evidence to reject H_0 in favour of H_1 on a 5% significance level. We therefore accept H_0.

Step 6: Since we have accepted H_0, we conclude that the variables are not negatively correlated.

page 887 **ANSWERS EXERCISE 9H** Question **14 c**, should be:

14 **a** $\overrightarrow{AB} = \begin{pmatrix} 4 \\ k-3 \end{pmatrix}$, $|\overrightarrow{AB}| = \sqrt{16 + (k-3)^2}$ units

b $k = 0$ or 6 **c**



page 943 **ANSWERS EXERCISE 24C** Question **3 c**, should read:

3 **c** At $t = 5$ s, the stone is 367.5 m above the ground and moving upward at 49 m s^{-1}. It has acceleration -9.8 m s^{-2}. At $t = 12$ s, the stone is 470.4 m above the ground and moving downward at 19.6 m s^{-1}. It has acceleration -9.8 m s^{-2}.

page 955 **ANSWERS EXERCISE 27H** Question **1 c i**, should read:

1 **c** **i** $\mu = 4.8$, $\sigma \approx 0.980$

page 958 **ANSWERS EXERCISE 28B.1** Question **10 a**, should read:

10 **a** $\mu \approx 176$ g, $\sigma \approx 24$ g **b** $\approx 81.85\%$

page 958 **ANSWERS EXERCISE 28B.2** Question **10 b**, should read:

9 **a** $\approx 10.3\%$ **b** ≈ 0.456 **10** **a** $\approx 84.1\%$ **b** ≈ 0.879

The following erratum was made on 13/Nov/2019

page 921 **ANSWERS EXERCISE 17C.2** Question **2 b**, last line of part **ii** should instead belong to part **i**:

2 **b** **i** $\lim\limits_{x \to -\infty} (e^x - 6) = -6$

$y = -6$ is a horizontal asymptote of $y = e^x - 6$.

ii $\lim\limits_{x \to \infty} (e^x - 6)$ does not exist

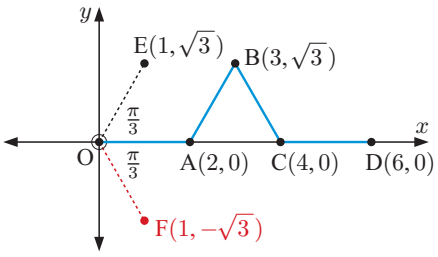
The following erratum was made on 22/Oct/2019

page 371 **SECTION 14G ACTIVITY 3 FRACTAL GEOMETRY** Part 2, should read:

PART 2: VON KOCH'S CURVE

The von Koch curve begins with the line segment [OD] shown. Its first iteration, shown in blue, is generated by the affine IFS $\{f_1, f_2, f_3, f_4\}$ where:

- f_1 is the transformation mapping [OD] to [OA]
- f_2 is the transformation mapping [OD] to [AB]
- f_3 is the transformation mapping [OD] to [BC]
- f_4 is the transformation mapping [OD] to [CD].



What to do:

1 Describe in words, the transformation:

a [OD] to [OA] **b** [OA] to [OE] **c** [OE] to [AB]

d [OA] to [OF] **e** [OF] to [BC] **f** [OA] to [CD].