

Answer key

Answer key

Section 1: Number and algebra

Now you practise it

Topic: Sequences and series – arithmetic

May 1999

- (a) \$500
(b) \$5100

November 2003

- (a) $u_1 + 3d = 12$
 $u_1 + 9d = 42$
(b) $d = 5, u_1 = -3$

Topic: Sequences and series – geometric

Specimen 2005 Paper 1

- (a) $r = 2$
(b) 114 681

May 2000

- (a) 42 000
(b) 32 908

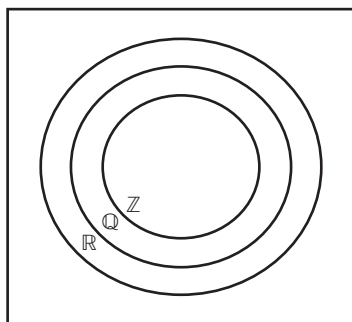
Topic: Number sets

November 2002 Paper 1

	\mathbb{N}	\mathbb{R}	\mathbb{Q}
5	✓	✓	✓
0.5	✗	✓	✓
$\sqrt{5}$	✗	✓	✗
-5	✗	✓	✓

Specimen 2005 Paper 1

- (a) For example, 2, -3 etc.
(b) For example, $\frac{3}{5}$ (not $\frac{6}{1}$)
(c) For example, 2, π
(d) U



For $Z \subset Q$
For $Z \subset R$
For $Q \subset R$

Topic: Approximation, significant figures, percentage errors, estimation

November 2003 Paper 1

- (a) 412.199 412 3
(b) 412.20
(c) 410

May 2004 Paper 1

- (a) 730
(b) 500
(c) 31.5% (3sf)

Topic: Scientific notation and the SI (metric) system

November 2000 Paper 1

- (a) 2.79×10^{-6}
(b) 1.024×10^{-2}

May 2005 Paper 1

- (a) 2 ml
(b) 5 460 410 000 joules
(c) kg ms^{-1}

Topic: Word problems and systems of linear equations

May 2002 Paper 1

- (a) $r = 200$ AUD
(b) $s = 525$ AUD

May 1998 Paper 1

- (a) $\frac{x}{5}$
(b) $\frac{7x}{125}$ (housekeeping fees included) or $\frac{7x}{100}$ (housekeeping not included)
(c) £200

Topic: Quadratic equations

November 1999 Paper 1

- (a) $W = 110 - x$
(b) Area = $x(110 - x)$
(c) 2800 m^2

May 2002 Paper 1

- (a) $x = 8, x = -3$
(b) $a = 3$

Additional practice problems

- 1 (a) $(5k - 2) - (2k + 3) = (10k - 15) - (15k - 2)$
 $3k - 5 = 5k - 13$
 $8 = 2k$
 $4 = k$
(b) 11, 18, 25
(c) 7
(d) 144
(e) 900
2 (a) $x = 400, y = 60$
(b) 61 months

Answer key

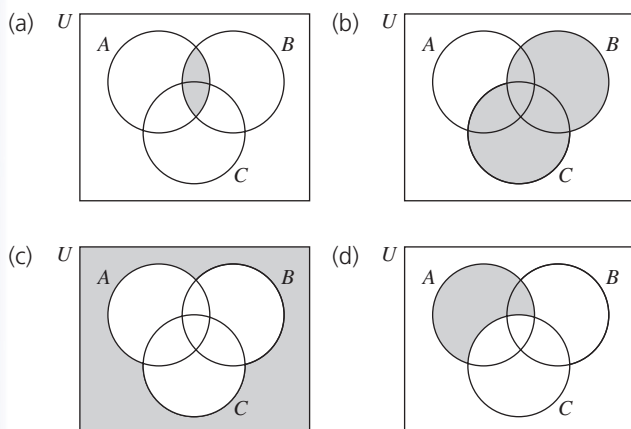
- 3 (i) (a) $u_1 = d = 1$
 (b) $\frac{1}{2}n(2u_1 + d(n - 1)) = \frac{1}{2}n(2 + n - 1) = \frac{1}{2}n(n + 1)$
 (c) 20 100
 (ii) (a) $n = 10$
 (b) $r = \frac{1}{3}$
 (c) 1.50
 (d) Both $1.5(\frac{1}{3})^{10}$ and $1.5(\frac{1}{3})^{1000}$ are 0 when corrected to 3sf, so they make no difference to the final answer.
 (e) 29 525.5
- 4 (a) $l = 2x + 5$
 (b) Area of frame, $A = (2x + 5)^2 - 5^2$
 (c) $x = 1$

Section 2: Sets, logic and probability

Now you practise it

Topic: Set theory and Venn diagrams

November 2004 Paper 1



November 2007 Paper 1

- (a) $A = 8, 10, 12, 14, 16$
 (b) $B = 3, 6, 9, 12, 15, 18$
 (c) $A \cup B = 3, 6, 8, 9, 10, 12, 14, 15, 16, 18$
 (d) $A \cap B = 8, 10, 14, 16$

Topic: Logic symbols and statements

May 2002 Paper 1

- (a) (i) If a figure is a rhombus, then it is a square.
 (ii) If a figure is not a square, then it is not a rhombus.
 (iii) If a figure is not a rhombus, then it is not a square.
 (b) Statement (iii) is true.

November 2006 Paper 1

- (a) Dany either goes to the cinema or studies for the test but not both.
 (b) (i) $p \Rightarrow \neg q$
 (ii) $q \Rightarrow \neg p$

Topic: Truth tables

May 2006 Paper 1

- (a) If I am wearing my hat then the sun is not shining.

(b)

p	q	$\neg p$	$q \Rightarrow \neg p$
T	T	F	F
T	F	F	T
F	T	T	T
F	F	T	T

(c) $\neg p \Rightarrow q$

November 2005 Paper 1

p	q	$\neg q$	$(p \wedge \neg q)$	$(p \vee q)$	$(p \vee \neg q) \Rightarrow (p \vee q)$
T	T	F	F	T	T
T	F	T	T	T	T
F	T	F	F	T	T
F	F	T	F	F	T

Topic: Probability: simple problems

May 1996 Paper 1

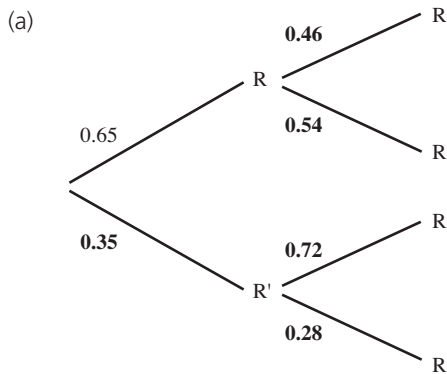
- (a) $\frac{4}{5}$
 (b) $\frac{5}{9}$

May 2000 Paper 1

- (a) 10 combinations
 (b) $\frac{1}{10}$

Topic: Probability: harder problems (compound and conditional probability)

November 2005 Paper 1



(b) 0.551

November 1999 Paper 1

- (a) $\frac{4}{9}$
 (b) $\frac{2}{9}$

Additional practice problems

- 1 (i) (a) (i) $p(\text{green}) = \frac{5}{10}$
 (ii) $p(\text{not green}) = \frac{5}{10}$
 (b) (i) $\frac{4}{9}$ or 0.444 (3sf)
 (ii) $\frac{2}{9}$ or 0.222 (3sf)
 (iii) $\frac{5}{9}$ or 0.556 (3sf)
 (c) (i) $\frac{1}{12}$ or 0.0833 (3sf)

Answer key

- (ii) $\frac{5}{12}$ or 0.417 (3sf)
- (iii) $\frac{11}{12}$ or 0.917 (3sf)

- (ii) (a) 0.0135 (3sf)
- (b) 0.185 (3sf)

2

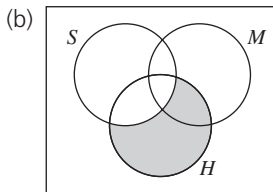
- (i) (a) 11 students
- (b) 74 students
- (c) 2 students
- (d) 77 students
- (ii) (a) (i) If you do not watch the music TV channel, then you do not like music.
- (ii) If you like music, then you watch the music TV channel.
- (b)

p	q	$\neg p$	$\neg q$	$p \Rightarrow q$	$\neg p \Rightarrow \neg q$	$p \vee \neg q$	$\neg p \wedge q$
T	T	F	F	T	T	T	F
T	F	F	T	F	T	T	F
F	T	T	F	T	F	F	T
F	F	T	T	T	T	T	F

(c) $\neg p \Rightarrow \neg q$ and $p \vee \neg q$ are logically equivalent.

3

- (a) (i) 4 students
- (ii) A is the set of students who study maths but do not study history or science.
- (iii) 2 students



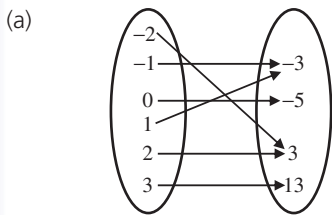
- (c) 13
- (d) (i) $\frac{1}{10}$ or 0.1
- (ii) $\frac{7}{10}$ or 0.7
- (e) (i) $\frac{1}{95}$ or 0.0105
- (ii) $\frac{6}{95}$ or 0.0632
- (iii) $\frac{8}{19}$ or 0.421

Section 3: Functions

Now you practise it

Topic: Definition of a function, mapping diagrams, domain and range

Specimen 2005 Paper 1

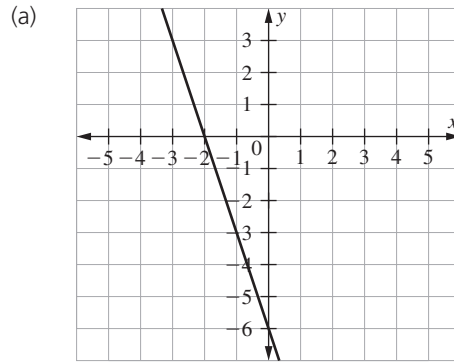


- (b) $x \in \{-2, -1, 0, 1, 2, 3\}$
- (c) $y \in \{-5, -3, 3, 13\}$

November 2004 Paper 1

- (a) domain: $x < 3$, range: $y \leq 2$
- (b) domain: $\{-3, -2, -1, 0, 1, 2, 3\}$, range: $\{1, 2, 3, 4\}$

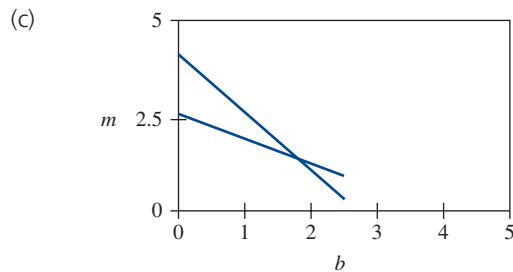
Topic: Linear functions and graphs
May 2005 Paper 1



(b) $3x + y = -6$

May 2007 Paper 1

- (a) $2b + 3m = 7.80$
- (b) $b = \$1.80, m = \1.40



Topic: Quadratic functions and graphs

November 2004 Paper 1

- (a) $(x - 3)(x + 1)$
- (b) $A(-1, 0), B(3, 0)$
- (c) $x = 1$
- (d) $C(1, -4)$

May 2003 Paper 1

- (a) $c = 6$
- (b) $a = -2$
- (c) $y = -2(x - 3)(x + 1)$

Topic: Exponential functions and graphs

November 2006 Paper 1

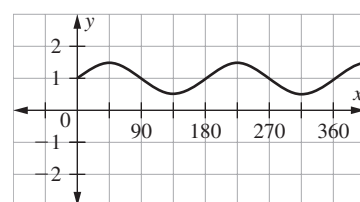
- (a) (i) 32 000 USD
- (ii) $r = 0.85$
- (b) $t = \text{years}$

November 2001 Paper 1

$c = -10, k = 5$

Topic: Trigonometric functions and graphs

November 2007 Paper 1



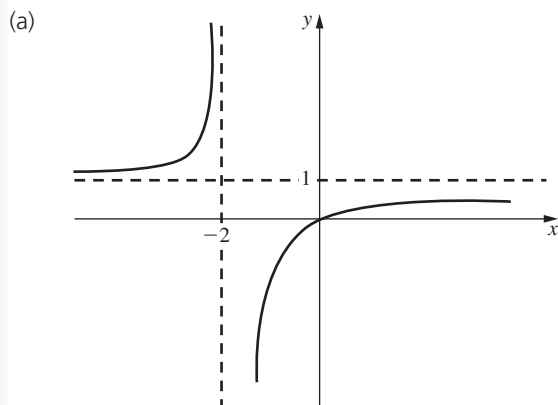
Answer key

- (b) period = 180°
- (c) amplitude = $\frac{1}{2}$

May 2007 Paper 1

- (a) (i) period = 180°
(ii) amplitude = 2
- (b) $a = 2, c = 1$
- (c) -15°

**Topic: Unfamiliar functions and graphs
Specimen 2005 Paper 1**



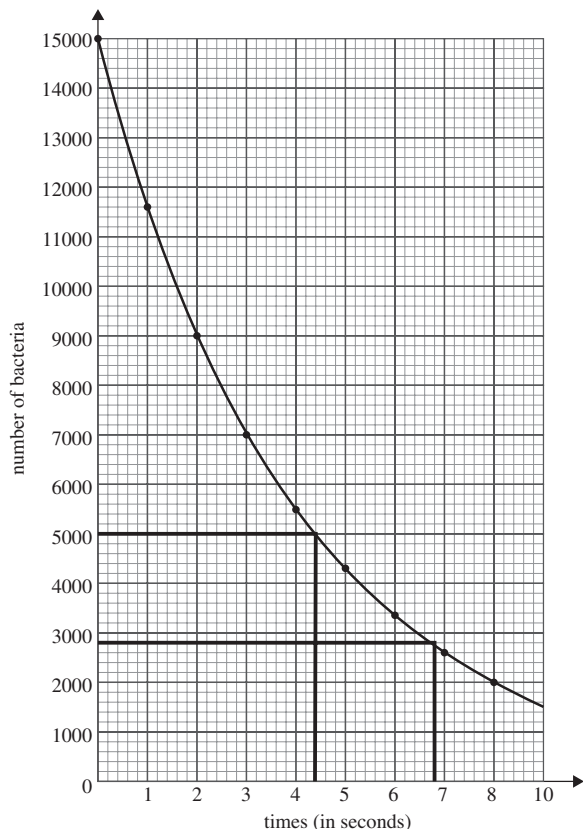
- (b) horizontal asymptote $y = 1$, vertical asymptote $x = -2$

November 2006 Paper 1

- (a) $A(-1.79, 0.789), B(1.14, 2.70)$
- (b) $-1.79 < x < 1.14$

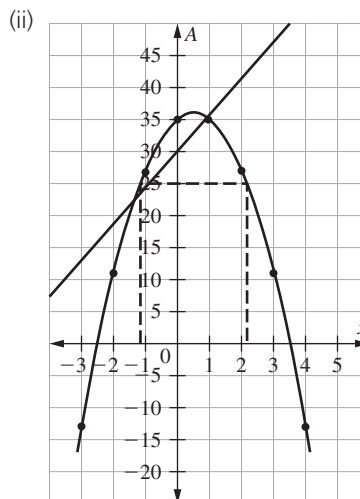
Additional practice problems

- 1 (a) $a = 15\ 000, b = 5500, c = 2000$
(b)



- (c) (i) 4.4 secs
(ii) 2700 bacteria
(iii) No. Theoretically, the curve never touches the horizontal axis.

- 2 (a) $A = (5 + 2x)(7 - 2x)$
 $= 35 - 10x + 14x - 4x^2 = 35 + 4x - 4x^2$
(b) (i) $p = 11, q = 35, r = 27, s = -13$



- (c) (i) axis of symmetry is $x = \frac{1}{2}$
(ii) $x = 2$
(iii) 3 m \times 9 m
(d) (i) See line on graph shown above.
(ii) $x = 1$ or $x = -1.25$

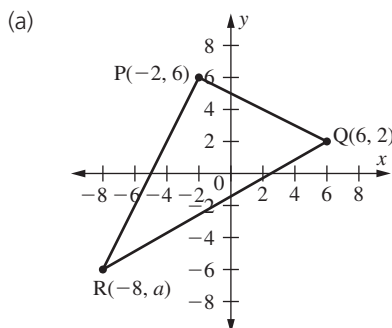
- 3 (a) (i) 1.75 m
(ii) 01:38 and 06:22
(b) $2 < t < 6$
(c) $a = 1.5, b = 45$
(d) 1.94 m
(e) 12 noon

Section 4: Geometry and trigonometry

Now you practise it

Topic: Coordinates, midpoint and distance formulae

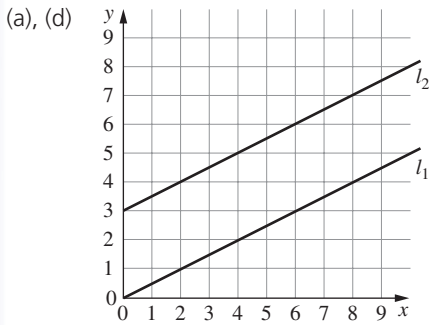
May 2004 Paper 2 (modified)



- (b) $PQ = \sqrt{80} = 8.94$ (3sf)
- (c) $a = -6$
- (d) Area = 60

Answer key

Topic: Equation of a line: forms, slope/gradient, perpendicular and parallel lines
November 2001 Paper 1



- (b) l_1 is parallel to l_2
 (c) $y = \frac{1}{2}x + 3$

May 2001 Paper 1

- (a) $m = 3$
 (b) $m = -\frac{1}{3}$
 (c) $b = 6$

Topic: Right-angled triangle trigonometry (SOHCAHTOA)
November 2001 Paper 1

- (a) 37.5 cm
 (b) 46.8°

May 2001 Paper 1

8.17 cm (3sf)

Topic: Sine rule and area of a triangle
May 2001 Paper 1

- (a) 52.6 m^2 (3sf)
 (b) 24.7°

May 1999 Paper 1

- (a) 134°
 (b) 8.15 cm (3sf)

Topic: Cosine rule
November 2007 Paper 1

- (a) 1270 m
 (b) 49.3°

May 2003 Paper 1

- (a) 120°
 (b) 6.93 cm^2
 (c) 41.6 cm^2

Topic: Geometry of 3-D shapes
In the style of Paper 1

- (a) 25.1 cm^3 (3sf)
 (b) 6.28 cm^2 (3sf)
 (c) 182 cm^2 (3sf)

Specimen 2005 Paper 1

- (a) 3125 m^3
 (b) 56.0 m (3sf)
 (c) 87.4° (3sf)

Additional practice problems

- 1** (i) (a) 1294.14 cm^3
 (b) 6 balls
 (c) (i) 431 cm^3
 (ii) $4.31 \times 10^{-4} \text{ m}^3$
 (ii) (a) (i) 73.5°
 (ii) 55.8 m (3sf)
 (b) 55.0 m (3sf)
 (c) 217 m (3sf)
- 2** (a) $CA = \sqrt{(500^2 + 800^2)} = 943$
 (b) angle $BCA = \tan^{-1}\left(\frac{800}{500}\right) = 58.0^\circ$
 (c) (i) 78°
 (ii) 1600 m (3sf)
 (d) $892\,000 \text{ m}^2$
 (e) 18.3 minutes
- 3** (a) 11.3 cm
 (b) 68.9°
 (c) $AB = 6 \text{ cm}$. Area = $2 \times (8 \times 8) + 4 \times (6 \times 8) = 320 \text{ cm}^2$
 (d) 192 cm^3

Section 5: Statistics

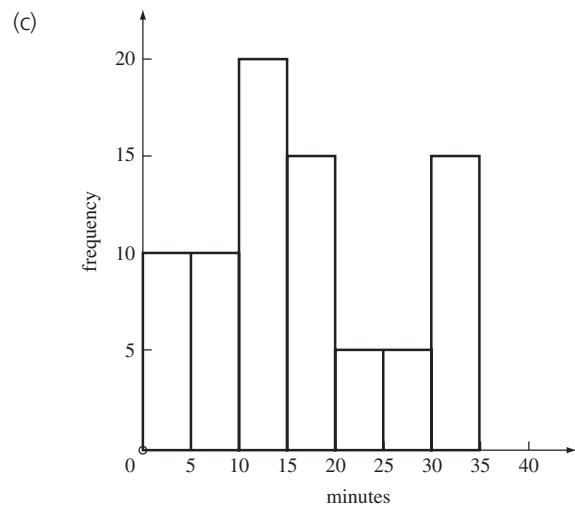
Now you practise it

Topic: Classification of data, frequency tables and polygons
November 2005 Paper 1 (modified)

- (a) $a = 2, b = 4$
 (b) $14 < x \leq 16$
 (c) 15.7 (3sf)

Topic: Grouped data, histograms, stem-and-leaf plots
November 2003 Paper 1 (modified)

- (a) 15 students
 (b) 25 students



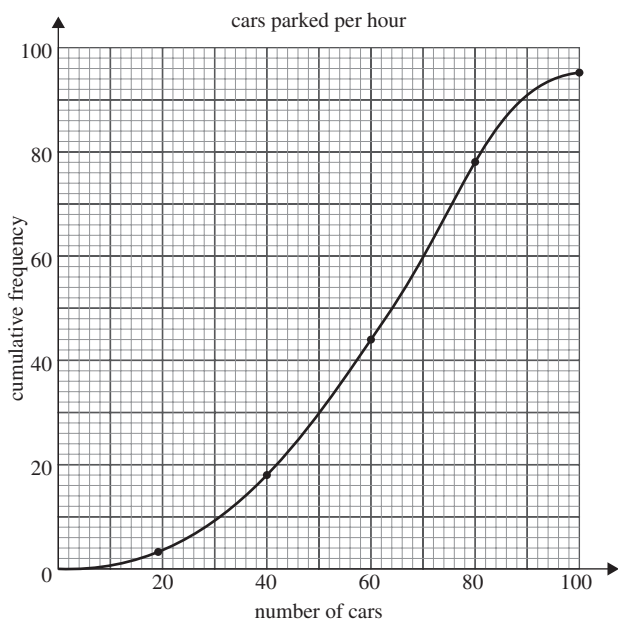
Topic: Cumulative frequencies, box-and-whisker plots
May 2004 Paper 1

- (a) $m = 168, n = 200$
 (b) 137 students
 (c) 18 years

Answer key

May 2005 Paper 1

- (a) $w = 43$
 (b)



- (c) median = 63 cars

Topic: 1-variable statistical calculations
 November 2004 Paper 1

- (a) mode = 6 hours
 (b) mean = 6.1 hours

May 2004 Paper 1

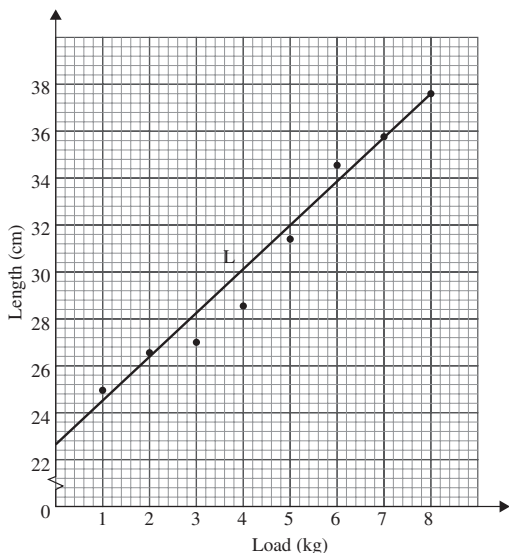
- (a) 6
 (b) 11.7 m

Topic: Linear regression (line of best fit)
 November 2007 Paper 1

- (a) $y = 20.9 - 0.134x$
 (b) 17 objects
 (c) $r = -0.756$
 (d) negative and moderately strong

November 2006 Paper 2 (modified)

- (a), (c)



(b) $y = 1.83x + 22.7$

Topic: Chi-squared (χ^2) independence test
 November 2001 Paper 2 (modified)

- (a) $p = 25.2, q = 16.8, r = 12.4$
 (b) (i) H_0 : There is no connection between gender and the subject taken.
 (ii) $df = (3 - 1)(2 - 1) = 2$
 (iii) $\chi^2(2) = 5.99$
 (c) Accept H_0 since $1.78 < 5.99$

May 2006 Paper 2 (modified)

- (a) H_0 : Level of stress is independent of travel time.
 H_1 : Level of stress is not independent of travel time.

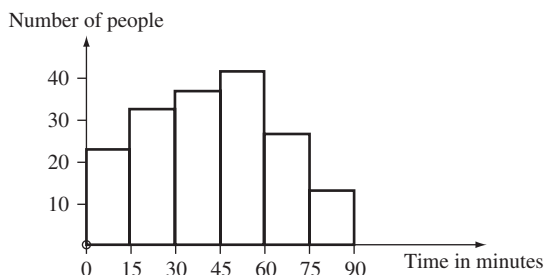
- (b)

12	5	15
20	9	24
12	5	14

- (c) $df = (r - 1)(c - 1) = (3 - 1)(3 - 1) = 4$
 (d) $\chi^2 = 9.28$
 (e) Accept H_0 (Level of stress is not independent of travel time.)

Additional practice problems

- 1 (i) (a) mode: $45 \leq t < 60$
 (b) mean: 42.4 minutes, standard deviation: 21.6 minutes
 (c)



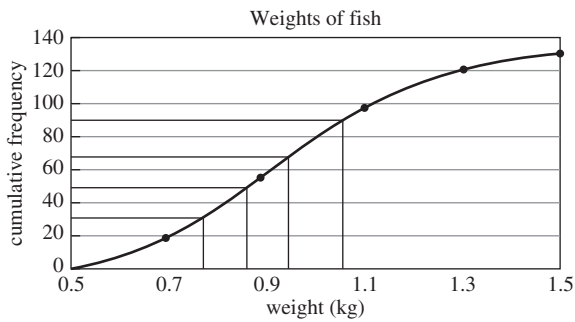
- (ii) (a)

	Drama	Comedy	Film	News
Males	58	119	157	52
Females	86	98	120	61

- (b) H_0 : Favourite TV programme is independent of gender.
 H_1 : Favourite TV programme is dependent on gender.
 (c) 105
 (d) 12.6
 (e) (i) 3
 (ii) 7.815
 (iii) Reject H_0
- 2 (a) mean of $x = 72.25$, standard deviation of $x = 4.41$
 mean of $y = 139.7$, standard deviation of $y = 5.99$
 (b) $r = -0.940$
 (c) strong, negative correlation
 (d) $y = 232 - 1.28x$
 (e) 136 seconds

Answer key

- 3 (a) (i) $c = 97$
 (ii) (not drawn to scale)



- (iii) (see line on graph)
 (b) (i) 13 fish
 (ii) 0.79 kg
 (c) (i) minimum: 0.855 kg, maximum: 1.045 kg
 (ii) 42 fish

Section 6: Introductory differential calculus

Now you practise it

Topic: Differentiation and the derivative of a polynomial

May 2006 Paper 2 (modified)

- (a) $g(2) = 8$
 (b) $g'(2) = \frac{1}{2}x^3 + \frac{9}{2}x - 5$

Topic: Equations of tangent lines, values of x when $f'(x)$ is given

Specimen 2005 Paper 1 (extra question bank)

- (a) $f'(x) = 2 + 25x^{-2}$
 (b) $x = \pm 2.5$

November 2004 Paper 2

- (a) $2ax + b$
 (b) $2 = 12a + b$
 (c) $-7 = 3a + b$

Topic: Increasing and decreasing functions, max/min problems (optimisation problems)

November 2004 Paper 2 (modified)

- (a) $B \rightarrow D, G \rightarrow L$ (or $G \rightarrow K$ and $K \rightarrow L$) (or C, H, L)
 (b) $A \rightarrow B, D \rightarrow G$ (or A, E, F)
 (c) D
 (d) B or G

November 2001 Paper 2 (modified)

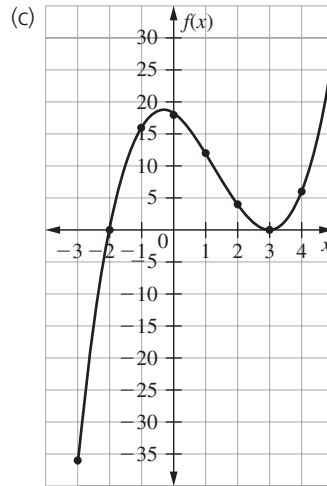
- (a) $B = x(24 - 2x)(9 - 2x) = 4x^3 - 66x^2 + 216x$
 (b) $12x^2 - 132x + 216$
 (c) (i) $x = 2$ cm
 (ii) 200 cm³

Additional practice problems

- 1 (i) (a) $g'(x) = 4x^3 + 9x^2 + 4x + 1$
 (b) $g'(1) = 18$
 (ii) (a) $x - 15$
 (b) Profit = $(x - 15)(100\,000 - 4000x)$
 $= 100\,000x - 4000x^2 - 1\,500\,000 + 60\,000x$
 (c) (i) $160\,000 - 8000x$
 (ii) $x = 20$
 (d) 20 000 books

- 2 (a) 38.4 cm
 (b) (i) $24 - 4.8w$
 (ii) 3.5 weeks
 (iii) 5 weeks, 60 cm
 (c) 70 days = 10 weeks; $h(10) = 24(10) - 2.4(10)^2 = 0$
 (height of zero means daffodil is lying on the ground)

- 3 (a) (i) $3x^2 - 8x - 3$
 (ii) $\max(-\frac{1}{3}, 18.5), \min(3, 0)$
 (b) $a = 0, b = 18$



- (d) (i) $-\frac{1}{3} < x < 3$
 (ii) $-3 \leq x < -\frac{1}{3}$ or $3 < x \leq 5$

Section 7: Financial mathematics

Now you practise it

Topic: Currency conversions

May 2003 Paper 1

- (a) 1413.16 USD
 (b) 1288.34 MD

November 2002 Paper 1

- (a) 325 CHF
 (b) $s = 2.5(b - 3)$
 (c) 175 GBP

Topic: Simple and compound interest

May 2000 Paper 1

- (a) 14 000 CHF
 (b) 29 201.29 CHF

November 2000 Paper 1

- (a) $X(1.005)^{12}$
 (b) 6.17%

Topic: Loan and savings tables

Specimen 2000 Paper 1

- (a) 95.07 AUD
 (b) 12 547.20 AUD

Additional practice problems

- 1 (i) (a) $p = 0.159, q = 17.5$
 (b) (i) 1390 FFR (3sf)
 (ii) 137 GBP (3sf)

Answer key

- (c) (i) 1600 FFR
(ii) 304 USD (3sf)
(iii) Paul
(iv) Jean: $1600 \text{ FFR} \cdot \frac{1600}{6.289} = 254.41$ or
254 USD (3sf); Paul: 304 USD (3sf)
- (ii) Takaya: $1000 + 1000(0.063)(15) = 1945 \text{ JPY}$
Morimi: $900(1.063)^{15} = 2250 \text{ JPY}$; Morimi had more.

- 2** (a) (i) \$507.30
(ii) 12.7% (3sf)
(b) (i) \$1000
(ii) \$450.00
(c) (i) Option A. Because she doesn't need a deposit.
(ii) Option B. Because it is cheaper by \$57.30.

- 3** (a) end January: $600 \times 1.0075 = 604.50$
begin February: $604.50 + 1300 = 1904.50$
end February: $1904.50 \times 1.0075 = 1918.78$
(b) 2896.46 AUD
(c) 3074.88 AUD
(d) 3 years

- 4** (a) Choice A: \$1200
Choice B: \$1239.51
Choice C: \$1230
Choice D: \$1273.37
(b) Choice D because the total allowance is the highest.
(c) 10%

Answer key – Practice exam 1

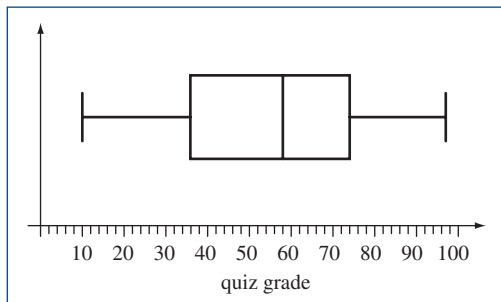
Answer key – Practice exam 1

Paper 1

- 1 (a) 11.6725 watts
(b) 10 watts
(c) 1.17×10^1 watts

- 2 (a) 3
(b) 105
(c) 15 150

- 3 (a) 58
(b) 36
(c)



- 4 (a) 0
(b) $(x + 3)(x - 2)$
(c) $(-3, 0), (2, 0)$

- 5 (a) 5.57 cm (3sf)
(b) 8.04 cm^2 (3sf)

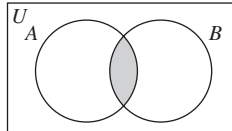
- 6 (a) \$15 503.96
(b) \$7751.98

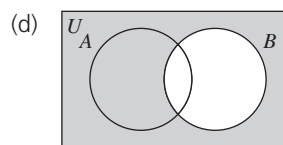
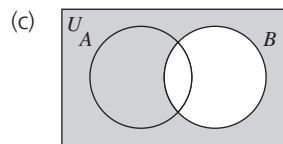
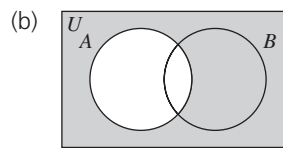
- 7 (a) $p \Rightarrow q$
(b) If I slap you, you will insult me one more time.
(c) $p \Rightarrow q$ but q does not $\Rightarrow p$

- 8 (a) vertical: $x = -1$, horizontal: $y = 0$
(b) $(6.41, 0.41)$ and $(-1.41, -7.41)$

- 9 (a) The length of the extended essay is not dependent on the number of hours of sleep the night before it is due.
(b) 11.8 (3sf)
(c) The chi-squared statistic is less than the chi-squared critical value of 5.99 at 5% significance level, so we accept the null hypothesis. Therefore, the length of the essay is not dependent on the hours of sleep.

- 10 (a) \$1831.78
(b) \$125.24
(c) \$676 (3sf)

- 11 (a) 



- 12 (a) $a = 2$
(b) $b = 4$
(c) $c = -1$

- 13 (a) $x = 4$
(b) $y = 1$

- 14 (a) It is not true that Katie has brown hair if and only if she is good at mathematics.

(b)

p	q	$p \Leftrightarrow q$	$\neg(p \Leftrightarrow q)$
T	T	T	F
T	F	F	T
F	T	F	T
F	F	T	F

- (c) The statement is not a tautology because it is not always true.

- 15 (a) $(-5, -1)$
(b) 671 m
(c) Sarah lives about 808 m from school, so Salome is closer.

Paper 2

- 1 (i) $\frac{1}{10}$
(ii) $\frac{4}{9}$
(iii) $\frac{1}{1000}$
(iv) $\frac{72}{1000}$
(v) $\frac{927}{1000}$
(vi) 0.139 (3sf)

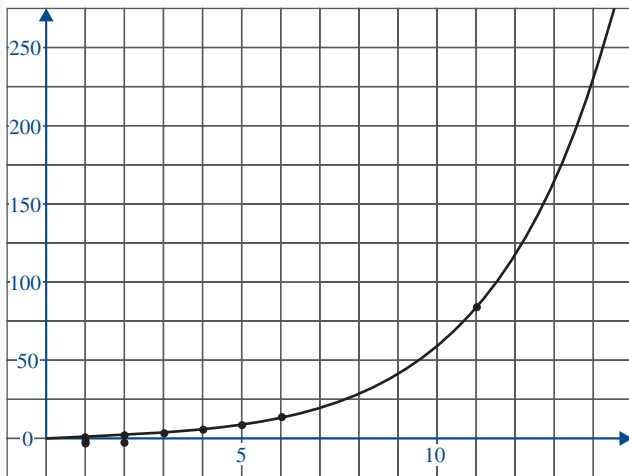
Answer key – Practice exam 1

- 2** (a) $2x - 2$
 (b) (i) -2
 (ii) $y = -2x - 2$
 (c) vertex: $(1, -3)$, gradient: 0
 (d) (i) $x > 1$
 (ii) $x < 1$

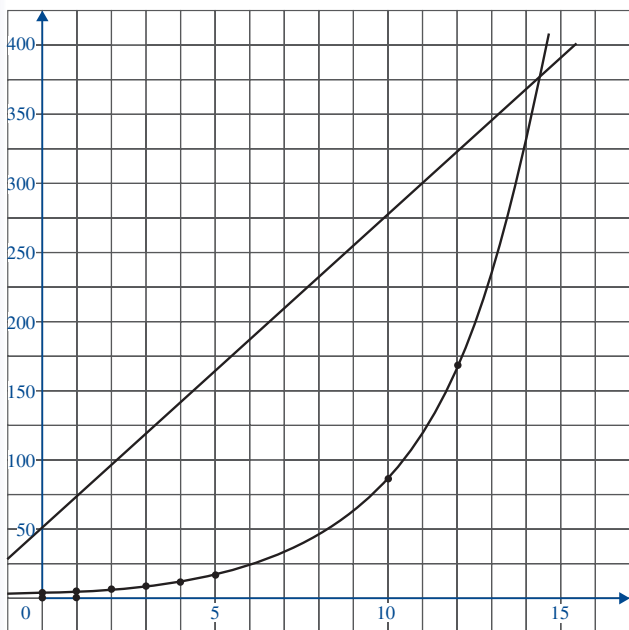
- 3** (a) (i)

t	0	1	2	3	4	5	10	12
A	3	4.2	5.88	8.23	11.5	16.1	86.8	170

(ii)



- (b) approximately 30 m^2 (31.6 m^2)
 (c) between 10 and 11 days (10.4 days)
 (d)



- (e) 14.4 days, or between 14 and 15 days

- 4** (a) (i) 170 cm^2 (3sf)
 (ii) 198 cm^2 (3sf)
 (iii) $C = \frac{0.03b}{12} + \frac{0.04w}{15}$
 (iv) $\$0.95$
 (v) Yes: it costs $\$0.98$.
 (b) (i) 10 cm
 (ii) 53.1°
 (iii) 67.0°

- 5** (a) mean: 51.3 sec, st. dev. 3.20 sec
 (b)

Year	1935	1954	1961	1972	1976	1985	2000	2008
x	0	19	26	37	41	50	65	73

- (c) (i) -0.988
 (ii) $t = -0.140x + 56.8$
 (iii) 50.48 sec
 (d) This would involve extrapolation that would extend too far from the given data so there is no guarantee a linear relationship would still hold.

Answer key – Practice exam 2

Answer key – Practice exam 2

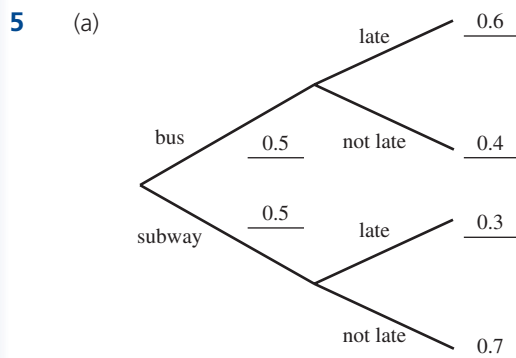
Paper 1

- 1** (a) 3
 (b) 8th term: 2187, 18th term: 129 140 163
 (c) 7 144 929

- 2** (a) 60.3° (3sf)
 (b) 10.8 cm
 (c) 11.1%

- 3** (a) $(\frac{4}{3}, 0)$
 (b) $-\frac{1}{5}$
 (c) $(\frac{7}{4}, \frac{5}{4})$

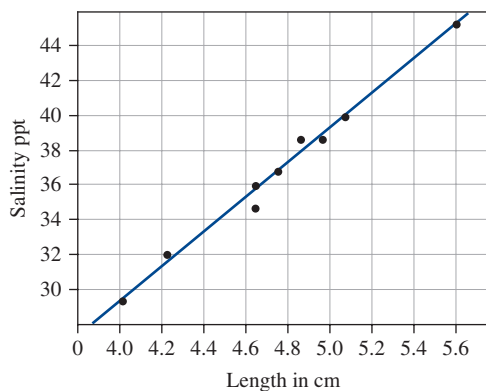
- 4** (a) $2x^2 - 9x + 4$
 (b) $(4, \frac{46}{3})$



- (b) 0.15
 (c) 0.667 (3sf)

- 6** (a) 13.9 cm (3sf)
 (b) 67.8° (3sf)
 (c) 295 cm^2 (3sf)

- 7** (a) $\bar{x} = 4.8 \text{ cm}$, $\bar{s} = 35.6 \text{ ppt}$ (3sf)
 (b) $s = 7.9x - 2.4$
 (c)



- 8** (a)

Date	Balance	Payment	Interest Paid from payment	Principal Paid from payment
Dec. 1, 2008	€15 000	€0	€0	€0
Jan. 1, 2009	€14 550	€600	€150	€450
Feb. 1, 2009	€14 095.50	€600	€145.50	€454.50

- (b) £11 475.24

- 9** (a) $4 \rightarrow \frac{12}{7}$
 $-1 \rightarrow \frac{3}{8}$
 $0 \rightarrow 0$
 $5 \times 10^{-1} \rightarrow \frac{-6}{35}$
 (b) $y \in \mathbb{R}$
 (c) $(2.32, -1.94)$ or $(-0.668, 0.234)$

- 10** (a) 35 years
 (b) 11 550 AUD

- 11** (a) $\frac{1}{36}$
 (b) $\frac{1}{4}$

- 12** (a) $a = 100$
 (b) $b = 0.912$ (3sf)
 (c) 25.3°C

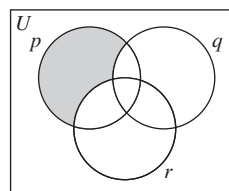
- 13** (a) 7.62 cm (3sf)
 (b) $(\frac{-3}{2}, \frac{19}{2})$
 (c) 44.1 cm^2 (3sf)

- 14** (a) Machine 4
 (b) Machine 1
 (c) Machine 2
 (d) Machine 2

- 15** (a) \$31 646
 (b) \$9738

Paper 2

- 1** (a)(i), (ii)



Answer key – Practice Exam 2

- (b) If Cuan has a score over 90% and Richard does not have a score over 90% then Hani has a score over 90% or Richard has a score over 90%.

(c) (i)

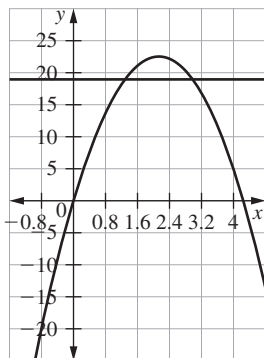
p	q	r	$\neg r$	$p \wedge \neg r$	$q \vee r$	$(p \wedge \neg r) \Rightarrow (q \vee r)$
T	T	T	F	F	T	T
T	T	F	T	T	T	T
T	F	T	F	F	T	T
T	F	F	T	T	F	F
F	T	T	F	F	T	T
F	T	F	T	F	T	T
F	F	T	F	F	T	T
F	F	F	T	F	F	T

- (ii) It is not a tautology because there is one false case.
 (d) (i) If Cuan does not have a score over 90%, then Richard does not have a score over 90%.
 (ii) Yes, they are logically equivalent.

2 (a)

time t	0	1	2	3	4
height h	0	16.1	22.4	18.9	5.6

(b) and (e)



- (c) (2.14, 22.5)
 (d) $x = 2.14$
 (f) 1.30 seconds (3sf)

- 3 (a) Null hypothesis: The time to finish the course is not dependent on riding conditions.
 Alternate hypothesis: The time to finish the course is dependent on riding conditions.

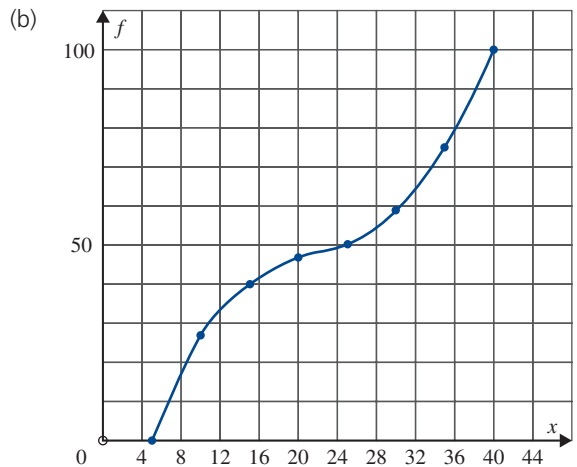
(b)

	clear weather	cloudy	rain
less than 2 minutes	8.09	7.80	10.11
between 2 and 3 minutes	9.96	9.60	12.44
greater than 3 minutes	9.96	9.60	12.44

- (c) $df = 4$
 (d) The p -value is greater than 0.05 so we accept the null hypothesis.
 (e) (i) Discrete – Lauren has categorised the weather into distinct categories.
 (ii) Continuous – time is ongoing.

- 4 (a) $AB = 303$ cm (3sf), $AC = 213$ cm (3sf), $BC = 200$ cm
 (b) (i) 1.08×10^9 km/hr
 (ii) 1×10^{-8} sec
 (c) 41.2°
 (d) $C = 3.2t + 20$
 (e) 9 hours

- 5 (a) mean: 22.6 cm (3sf),
 standard deviation: 12.25 cm (3sf)



- (c) (i) 25 cm
 (ii) 26 cm
 (iii) 38 cm
 (d) period: 30 seconds, amplitude: 10 cm
 (e) $a = -10$, $b = 12$, $c = 15$
 (f) 23.1 cm (3sf)

Answer key – Practice exam 3

Answer key – Practice exam 3

Paper 1

- 1 (a) $a = -14, b = 33$
 (b) -12

- 2 (a) $r = \frac{2}{3}$
 (b) $x = 24, y = 16$
 (c) 106 (3sf)

- 3 (a) $a = 3, b = 5$ or $a = 5, b = 3$
 (b) 5

- 4 (a) 0.416 792 758 9
 (b) 4.17×10^{-1}
 (c) 0.4168
 (d) 0.001 74%

- 5 (a) $(p \wedge q) \Rightarrow r$
 (b) Unconsented physical contact was made or contact was menacing or offensive, but not both, if and only if the person is guilty of battery.
 (c)

p	q	r	$p \vee q$	$(p \vee q) \Leftrightarrow r$
T	F	T	T	T
F	F	T	F	F

- 6 (a) domain: $x \geq 4$, range: $0 \leq y \leq 0.25$
 (b) (8, 0.25)
 (c) (4.31, 0.129), (8.33, 0.250)

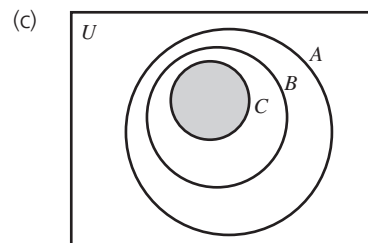
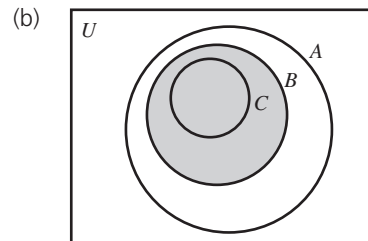
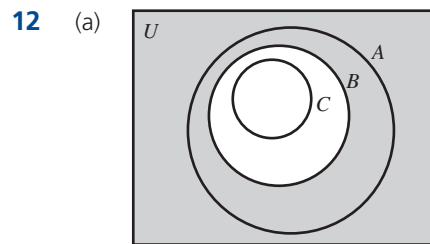
- 7 (a) 35.7° (3sf)
 (b) 183 cm^2 (3sf)
 (c) 136 cm^3 (3sf)

- 8 (a) $(x + 2)(x - 1)$
 (b) $g(x) = 12x - 2$
 (c) $x = -0.5$

- 9 (a) $df = 6$
 (b) 12.0
 (c) Accept null hypothesis at 99% level because $0.0128 > 0.01$.
 (d) One of the observed data values is less than 5.

- 10 (a) 1 yr: €1380.60, 2yrs: €1461.20, 3yrs: €1541.80, 4 yrs: €1622.40
 (b) $B = 1300 + 80.6k$
 (c) 9 years

- 11 (a) $A(t) = A(0.5)^{t/20}$
 (b) 2018



- 13 (a) $4x - 7y + 10 = 0$
 (b) 4.03 (3sf)

- 14 (a) $P = 10x - 3400$
 (b) 341 players

- 15 (a) (i) mean number of roses: 11, mean phone duration: 26.5 min
 (ii) st. dev. roses: 4.58, st. dev. duration: 10.2 min
 (b) 45.9 (3sf)
 (c) strong positive correlation

Paper 2

- 1 (a) 3
 (b)

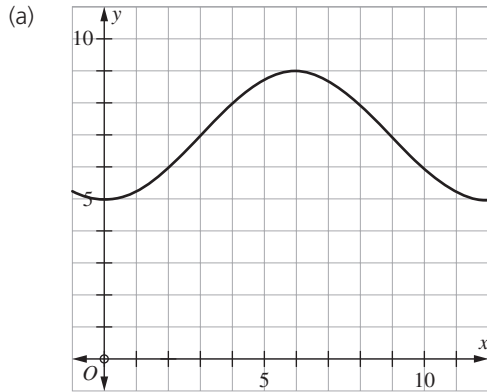
x	2	1.5	1.1	1.01	1.001	1.0001
$f(x)$	4.5	3.125	2.205	2.020 05	2.002 000 5	2.000 200 005
gradient of line \overline{AB}	2.5	2.25	2.05	2.005	2.0005	2.000 05

- (c) Slope at point A is 2. As A and B get closer and closer together, the gradient of AB gets closer and closer to 2.
 (d) $0.5x^2 + x + 0.5$
 (e) $f'(x) = x + 1$

Answer key – Practice Exam 3

- (f) $f'(1) = 2$
 (g) $(-1, 0)$

2

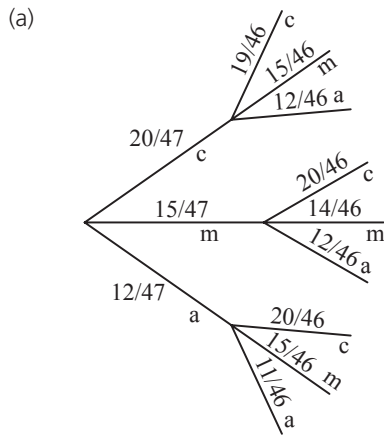


- (b) (i) 12
 (ii) 2
 (iii) 8
 (iv) 2 or 10
 (c) May 19 ($x = 4.6$) and August 12 ($x = 7.4$)
 (d) May 11

3

- (a) (i) 1890.00 XCD
 (ii) 5417.79 ZAR
 (b) 1832.20 XCD
 (c) 5255.26 ZAR
 (d) (i) 23.02 XCD
 (ii) 58.13 ZAR
 (e) 742.56 GBP

4



- (b) (i) 0.176
 (ii) 0.278
 (iii) 0.550
 (iv) 0.319
 (c) 0.413

5

- (a) 34.9° (3sf)
 (b) (i) 72.6° (3sf)
 (ii) 72.6° (3sf)
 (c) 20.0 m
 (d) 2320 m^2 (3sf)
 (e) $\frac{2318.072\ 26}{114.472\ 704\ 2} = \left(\frac{54}{12}\right)^2$
 $20.25 = 20.25$
 (f) 4.30 seconds (3sf)