

| | | | | | |
|----|-----|------|--|----------|-----|
| 1. | (a) | (i) | 2.618856114 | B1 | |
| | | (ii) | 2.62 <i>ft. if their answer > 3sf</i> | B1 | |
| | (b) | | 1.35×10^{-5} <i>0.0000135 gets B1</i> | B1,B1 | [4] |
| 2. | | | 120% → 600 <i>1.2</i> | B1 | |
| | | | $600 \div 120 \times 100$ <i>600 ÷ 1.2</i> | M1 | |
| | | | 500 | A1 | [3] |
| 3. | | | $700 \times 1.1^2 - 700$ <i>or 700 × 0.1 or 70 or 700 × 1.1 or 770</i> <i>or 700 × 1.1²</i> <i>or 847 or 140</i> | M1 | |
| | | | 147(.00) | A1 | [2] |
| 4. | (a) | | 400×1.64 656 | M1 A1 | |
| | (b) | | $672 \div 1.05$ 640 | M1 A1 | [4] |
| 5. | | | $12000 \div 24 (= 500)$ <i>M1 is for an attempt to add 3 ratios</i> <i>and divide into 12000</i> | M1 | |
| | | | (£)3500 | A1 | [2] |

6. (a) $3.6 \div \frac{2}{3}$ M1
 5.4 A1
 $3.6 \times 3 \div 2$
Allow $3.6 \div 0.66$ or better
- (b) 45 B1 [3]
7. (a) $A \propto w^2$ or $A = Kw^2$ M1
When $A = 12$, $w = 4$,
 $12 = 16K$
 $K = \frac{3}{4}$ M1
 $A = \frac{3}{4}w^2$ A1
- (b) When $w = 5$, $A = \frac{3}{4} \cdot 5^2$
 $= 18.75 \text{ m}^2$ B1
(ft if first M1 gained) [4]
8. (a) $4n + 1$ B2
oe
Accept $n \times 4 + 1$
 $4n + 1$ B1 for any of these:
 $n4 + 1$
 $4n \pm c$ with $c \neq 0$
- (b) 81 or 85 seen B1
 $T_{20} = 81$, next term is 85 B1
oe
alternative
 $4n + 1 = 83$ B1
82 not divisible by 4 (oe) B1
SCI for: $4n \pm c = 83 \Rightarrow n$ not a whole number
or T_{20} and T_{21} from their $4n \pm c$ [4]

| | | | |
|-----|---|-----|------------|
| 9. | Trial above 2.8796 <i>2 gives 6, 3 gives 24</i> | M1 | |
| | Trial below 2.8796 <i>2.9 gives 21.489, all values to at least 1 dp rounded or truncated</i> | M1 | |
| | Testing a value that justifies 2.9 as answer <i>2.5 → 13.125, 2.6 → 14.976, 2.7 → 16.983 2.8 → 19.152, 2.85 gives 20.299</i> | DM1 | |
| | $x = 2.9$ <i>Dep on any M mark</i> | A1 | |
| | | | [4] |
| 10. | Trial between 5 and 6 | B1 | |
| | Trials at 5.3 and 5.4 or better that bracket 110 <i>5.3 → 106(.47...) 5.4 → 114(.26...)</i> | B1 | |
| | Trial at 5.35 and answer 5.3 <i>5.35 → 110.3(3...)</i> | B1 | |
| | | | [3] |
| 11. | (a) $x + 1$ <i>oe Must be correct letter</i> | B1 | |
| | (b) $y - 2$ <i>oe Must be correct letter</i> | B1 | |
| | (c) 17.5 | B1 | |
| | | | [3] |

12. (a) $3y - 12$ B1
- (b) $6d - 2c$ B2
B1 for $-2c$
- (c) $x(x+5)$ B2
B1 for x
- (d) 32° M1,A1,A1
*M1 for $2x + x + 84 = 180$
 A1 for $3x = 96$
 A1 cao*

[8]

13. $(5x \pm a)(x \pm b)$ M1
M1 for attempt to factorise. Must have $(5x \pm a)(x \pm b)$ where $ab = \pm 3$, a, b must be integers.
- $(5x - 1)(x + 3)$ A1
- $(x - 3)(x + 3)$ B1
- $(5x - 1)(x - 3)$ B1
Answer seen and further work then deduct last B1.

[4]

14. (a) (i) $(x - 8)(x + 1)$ B2
B1 $(x \pm 8)(x \pm 1)$
- (ii) 8 and -1 B1 ft
- (b) $15x + 9y = 39$ or $25x + 15y = 65$
and and
 $15x + 25y = 15$ $9x + 15y = 9$ M1
allow a total of 1 error in either 1st or 2nd M mark
- $16y = -24$ or $16x = 56$ M1
- $y = -1.5$ or $x = 3.5$ A1
- $x = 3.5$ and $y = -1.5$ A1
*accept $y = -24/16$ and $x = 56/16$
 SC1 correct answers with no working or using T & I*

[7]

15. $(x - 5)^2 - 30 = 0$ M1
For attempt at $(x - 5)^2$,
 $x = \pm\sqrt{30} + 5$ A1
For -5 and -30
 $x = 10.48, -0.48$ A1
Both answers (Accept 10.5, -0.477)

ALTERNATIVE

- $x = \frac{10 \pm \sqrt{10^2 - 4 \times 1 \times -5}}{2 \times 1}$ M1
For substitution into formula (allow one error)
 $x = \frac{10 \pm \sqrt{120}}{2}$ A1
Correct substitution
 $x = 10.48, -0.48$ A1
Both answers (accept 10.5, -0.477)

[3]

16. (a) 5 B1
 -3 B1
 (b) Points plotted B1ft
 $\pm \frac{1}{2}$ square
 Smooth curve B1 ft
through their 6 points, $\pm \frac{1}{2}$ square
 (c) (i) Intersection with x -axis B1
 (ii) -0.2 B1 ft
 $\pm \frac{1}{2}$ square

[6]

17. (a) $160^2 + 75^2$ (25600 + 5625) M1
 31225 A1
 176.7..... A1
 177 or 180 B1

Independent mark. Award for any value seen or implied by a calculation greater than 3sf that is rounded to 3sf or 2sf

- (b) $\tan\theta = 160/75$ M2
 $\sin\theta = 160/\text{their}(a)$
 $\cos\theta = 75/\text{their}(a)$
M1 for fraction wrong way.

62.7° to 65.4° A1

[7]

18. (a) $\frac{\sin B}{19} = \frac{\sin 60}{17}$ M1

Accept $\frac{19}{\sin B} = \frac{17}{\sin 60}$

$\sin B = 0.9679(1...)$ A1

$B = 75.4(...)$ A1

- (b) $x^2 = 22^2 + 23^2 - 2 \times 22 \times 23 \times \cos 48$ M1

$x^2 = 335.8(...)$ A1

$x = 18.32(...)$ Alft

*ft only if an error made in calculation of x^2
 but not on $(22^2 + 23^2 - 2 \times 22 \times 23 (= 1)) \cos 48$
 ($= \sqrt{0.669} = 0.818$)*

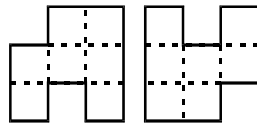
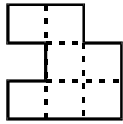
18 or 18.3 Blft

Independent mark. Award if value > 3sf seen or calculation seen.

[7]

| | | | | | |
|------------|-----|--|--|------|------------|
| 19. | (a) | (i) | 40 | B1 | |
| | | (ii) | 140 <u>or</u> 180 – (their x) <i>Do not ft if answer = 140 in (a)(i)</i> | B1ft | |
| | (b) | Logical and precise explanation (either written or as calculation) <i>B1 for 1 angle labelled or stated correctly, no reason</i> | | B2 | |
| | (c) | 24 \div 8 \times 2 <i>or OP = 6</i> | | M1 | |
| | | π (or 3.14) \times (their 6) ² | | M1 | |
| | | 36 π or 36 \times π or $\pi \times$ 36 <i>allow π^36 SC2 108 to 114 or $\pi \times$ 9 oe SC1 27 to 28.5</i> | | A1 | |
| | | | | | [7] |
| 20. | (a) | 65 | | B1 | |
| | (b) | 25 | | B1 | |
| | | | | | [2] |
| 21. | (a) | 6.5 \times 50 <i>allow 6.4 \times 50 to 6.6 \times 50</i> | | M1 | |
| | | 325 <i>allow 320 to 330</i> | | A1 | |
| | (b) | (0)55 <i>allow (0) 53 to (0) 57</i> | | A1 | |
| | (c) | 300 – 180 <i>oe or line from A on bearing approximately 300°</i> | | M1 | |
| | | 120 <i>118 to 122 (if line drawn from A)</i> | | A1 | |
| | | | | | [5] |

22.



B1 with 1 error

SC1 ± 90° degree rotation

B2

[2]

23. (a) Line through mid-point of PQ

$\pm 2mm$

2 pairs of arcs but no line: SC1

B1

Perpendicular to PQ

$\pm 2^\circ$

B1

(b) Arc of radius 7cm, centre S , at least from SR to their p.b.

$\pm 2mm$

M1

Area shaded

Arc attempted (well) without use of compass + correct area shaded: SC1

A1

[4]

24. (a) Appropriate scale on horizontal axis and blocks at boundaries

M1

Appropriate scale on vertical axis and plots at correct heights within classes

M1

Blocks or a frequency polygon

A1

Accept appropriate scale on horizontal

axis and plots at midpoints $\pm \frac{1}{2}$ sq

± 0.5 small square

(b) $90 \times 10 + 110 \times 3 + 130 \times 6 + 150 \times 1$

M1

$= 900 + 330 + 780 + 150$

M1

$2160 \div 20$

M1

$= 108$

A1 cao

all correct within ± 0.5 square

Any one correct midpoint seen or implied

Σfx for an x between or on boundaries

$(1960 \text{ to } 2360) \div 20$

$98 \text{ or } 118 \Rightarrow SC2$

[7]

25. (a) 6 B1
- (b) (Girls) average (length is different to boys) B1
oe or
- (Girls jump greater) spread (of lengths) B1
B1 Precise difference not related to average or spread
eg (A boy jumped) the longest length,
(The girls) LQ (is different to the boys)
For average allow:
eg, On the whole, on average, in general,
*overall, median, (**not** mean or mode),...*
For spread allow:
eg, Range, IQR, consistency, variability,...
- [3]**
26. $(6 + 6 + 7 + 6 + 6) \div 5$ **or**
 $(6 + 7 + 6 + 6 + 7) \div 5$ M1
- 6.2 A1
From correct method
- 6.4 M1
From correct method
- [3]**

27. (a) (i) $\text{fds} = \text{frequency} \div \text{class width}$ M1
M1 for attempt to find f.d's or use of 'scaling method'
- $= 5, 70, 170, 50, 20$ A1
A1 if all correct or heights in proportion. e.g. 1, 14, 34, 10, 4 or 25, 350, 850, 250, 100
- Plotting between limits to correct heights A1 f.t.
ft their fds
No scale on graph deduct a mark
- (ii) 100 B1
 100
- (b) 60 members = area below 50 M1
This mark is for identifying that the area below 50 is equivalent to 60 members
- area above 90 B1
e.g. 33 rows, 165 squares, 6.6 'squares'
- scale factor = 1.5 or $\frac{2}{3}$ M1
 ratio = $90:165 = 1:1.833$
 Fraction = $165/90 = 11/6$
oe e.g. $\frac{2}{3}$ members per square, or 1.5 squares per person
- $165 \div 1.5 \dots = 110$ A1 ft
 $60 \times 33 = 110$
 $60 \div 6 \times 11 = 110$
ft their scale factor if both M1s awarded but do not award if answer is not integer

[8]

28. (a) 43, 57, 57, 81 B3

-1 eeo. See below

NB allow ± 2 for each value (count up to 2 errors maximum)

NB Phy and Chem must be same

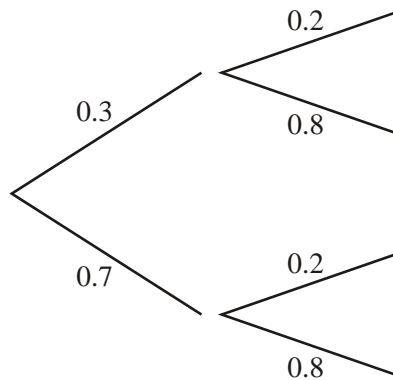
NB Total of all 4 values must be 237 or 238

(b) Sex of students B1

Any relevant factor – ages etc.

[4]

29. (a) B1



(b) 0.3×0.2 M1

oe

0.06 A1

or 6/100

[3]

30. $\frac{6}{10} \times \frac{4}{10} \times \frac{4}{10} \times \frac{3}{9}$ M1

First product correct

Second product correct

M1

$= \frac{24}{100} + \frac{12}{90}$ M1 dep

0.24 + 0.13

$= \frac{28}{75}$ A1

0.37 (or better)

[4]

31. (a) All 4 angles 180° , 90° , 54° , 36° seen or implied B2
Any one angle seen or implied B1
Must be exactly 4 sectors
- Sectors drawn accurately B1
 $\pm 2^\circ$
- Exactly 4 sectors labelled appropriately B1
Accept C, B, W, O
o not Accept angles or frequencies for labels
- (b) Based on a sample B1
They may not be typical
He did not ask enough of whole college BOD B1
He only asks 40 students
Sample too small

[5]