

Answers—Review Packet—Linear, Approximation and Error, Number Sets, and Scientific Notation

1. (a) $2J + 3C = 5.95$ (A2) (C2)
 (b) $2 \times 2.15 + 3C = 5.95$ (M1)
 $3C = 1.65$ (M1)
 $C = 0.55$ (A1)
 55 (pence) or £0.55 (C2)

[4]

2. (a) $c = 0.10k + 1.40$ (A1)
 (b) (i) $c = 0.10(7) + 1.40$ (allow follow through from part (a))
 $= 0.70 + 1.40$ (A1)
 $= \$2.10$
 (ii) $2.40 = 0.10k + 1.40$ (allow follow through from part (a))
 $1.00 = 0.10k$ (M1)
 $10 = k$
 10 km (A1)

[4]

3. (a) $mn = 6.0 \times 2.4 \times 10^{-2}$ (M1)
 $= 14.4 \times 10^{-2}$
 $= (1.44 \times 10^1) \times 10^{-2}$
 $= 1.44 \times 10^{-1}$ (A1)
 (b) $\frac{m}{n} = \frac{6.0}{2.4} \times 10^8$ (M1)
 $= 2.5 \times 10^8$ (A1)

[4]

4. (a) $(2.6 \times 10^4)(1.9 \times 10^4)$ (M1)(A1)
 $= 4.94 \times 10^8$ (A1)(A1) (C4)
 (b) $2(2.6 \times 10^4) + 2(1.9 \times 10^4)$ (M1)(A1)
 $= 9.0 \times 10^4$ (9 $\times 10^4$) (A1)(A1) (C4)

[8]

5. (a) Gradient of $l_2 = \frac{0 - (-2)}{5 - 0}$ (M1)
 $= \frac{2}{5}$ (A1)
 Gradient of $l_1 = \frac{-5}{2}$ (A1) (C3)

(b) $y = \frac{-5}{2}x + 7$ (A1)(A1)
 $2y = -5x + 14$
 $5x + 2y - 14 = 0$ (A1)(A1)(A1) (C5)

[8]

6. (a) $C = \frac{5(50 - 32)}{9}$ (M1)
 $= 10^\circ\text{C}.$ (A2) (C3)

(b) Put $C = -273$ (A1)
 so $-273 = \frac{5(F - 32)}{9}$ (M1)
 Hence $9 \times -273 = 5(F - 32)$ (M1)
 $F = -491.4 + 32 = -459.4$ (accept -459). (M1)(A1) (C5)

Note: (M1) is for adding 32, even if the other number is incorrect.

[8]

7.

Equation	Diagram number
$y = c$	2
$y = -x + c$	3
$y = 3x + c$	4
$y = \frac{1}{3}x + c$	1

(A2)

(A2)

(A2)

(A2) (C8)

[8]

8. (a) $\frac{x}{y} = \frac{6.4 \times 10^7}{1.6 \times 10^8}$ (M1)

$$= \frac{6.4}{1.6} \times \frac{10^7}{10^8} \quad (\text{M1})$$

$$= 4.0 \times 10^{-1} \text{ (accept } 4 \times 10^{-1}\text{)}. \quad (\text{A1})(\text{A1})(\text{C4})$$

Note: Award only (G2) for 0.4 or $4E^{-1}$, assumed to be obtained from GDC.

(b) $y - 2x = 1.6 \times 10^8 - 12.8 \times 10^7 \quad (\text{M1})$
 $= (1.6 - 1.28) \times 10^8 \quad (\text{M1})$
 $= 0.32 \times 10^8$
 $= 3.2 \times 10^7 \quad (\text{A1})(\text{A1})(\text{C4})$

Notes: Equivalent distribution if converted to 10^7 earlier. Award only (G2) for 32000000 or $3.2E^7$.

[8]

9. (a) The only prime number in U is 13. (A2) (C2)

Note: Award (A1) for {1, 13} and (A0) for any other answer.

(b) $A = \{-4, 1, 13, 69, 10^{33}\} \quad (\text{A2})(\text{C2})$

(c) $B = \{-4, -\frac{2}{3}, 1, 13, 26.7, 69, 10^{33}\} \quad (\text{A2})(\text{C2})$

(d) $A \cap B = \{-4, 1, 13, 69, 10^{33}\} (= A) \quad (\text{A2})(\text{C2})$

Note: In (b) and (d) allow (A1) for correct membership with at most one missing or one incorrect entry. A list with no set brackets is acceptable.

In (c) allow at most one missing entry for (A1) but if π is present award (A0).

[8]

10. (a) $w = (2.6 \times 10^4) \times (5.0 \times 10^{-8})$
 $= 13 \times 10^{-4}$ or 0.0013 (if written as working) (A2)
 $= 1.3 \times 10^{-3} \quad (\text{A1})(\text{A1})(\text{C4})$

Note: For incorrect answers with no working, award marks as follows:

13×10^{-4} : (A1)(A1), 0.0013: (G2), $1.3E-3$: (G2), $1.3E3$: (G1), 1.3×10^3 : (A2)(A0).

- (b) Statements (ii) and (iv) are incorrect. (A2)(A2) (C4)

*Note: Both correct statements given with **at most one extra**, allow (A2).*

[8]

11. (a) 1.265×10^{-1} (A1)(A1)(ft) (C2)

*Note: Exact answer, i.e **not** to 3 s.f. is required for first (A1).
Can (ft) the power from wrong magnitude coefficient.*

- (b) 0.13 (1.3×10^{-1}) (A1)(ft) (C1)

- (c) $\frac{0.13-0.1265}{0.1265} \times 100\%$ (M1)(A1)(ft)

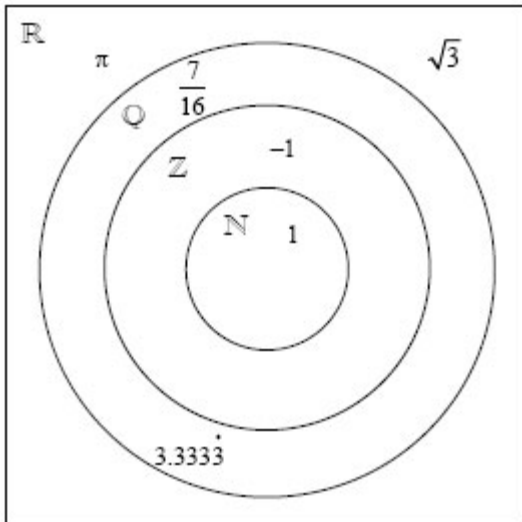
= 2.77% (A1)(ft) (C3)

Notes: Award (M1) for substituting numbers into the formula, (A1) for substitution of the correct numbers. The answer must be a percentage for award of the second (A1).

In this session, allow the formula with absolute value taken and 100 missing, with answer 0.0277. Note: this instruction is designed to address the problem that an old, incorrect version of the formula booklet was used by some schools.

[6]

12.



(A1) (A1)

(A1)

(A1)

(A1)

(A1)

(C6)

Notes: For any number entered exactly once, in the correct position, award (A1) if incorrect award (A0).

If all numbers entered in all regions award (A0).

If any number is entered in more than one region, penalize that number as follows:

(i) If none of the regions is correct award (A0)

(ii) If one of the regions is correct but other appearances of that number are in the COMPLEMENT of the correct set, award (A0) the first time this is seen.

(iii) If one of the regions is correct but other appearances of that number are in a SUBSET of the correct set award (A0) the first time this is seen.

Apply each of (ii) and (iii) at most once and award ft marks when the error is seen repeatedly, however, (ii) and (iii) may not both be applied to the same number and if both these errors are present with more than one number involved, follow through cannot be used until both penalties have been applied.

[6]

13.

	$\sqrt{3}$	6	$2\frac{1}{2}$	π	-5
N		✓			
Z		✓			✓
Q		✓	✓		✓

*Note: Accept any symbol for ticks.
Do not penalize if candidate had also indicated, by a different symbol, that the number is not an element of the set.*

Row N correct, no extra entries. (A1) (C1)

Row Z (A1)(A1)

Note: Award (A1) for each correct tick and no extra entries. Award (A1) only for both ticks correct and 1 extra entry, (A0) otherwise. (C2)

Row Q (A1)(A1)(A1)

Note: Award (A1) for each correct tick and no extra entries. Award (A2) only for all 3 correct and one extra entry. Award (A1) only for 2 correct and one extra entry. (A0) otherwise. (C3)

[6]

14. (a) 29.7675 (A1) (C1)

Note: Accept exact answer only

(b) 30 (A1)(ft) (C1)

(c) $\frac{30 - 29.7675}{29.7675} \times 100\%$ For correct formula with correct substitution. (M1)

= 0.781% (A1)(ft)

Note: accept 0.78% only if formula seen with 29.7675 as denominator (C2)

(d) $7.81 \times 10^{-1}\%$ (7.81×10^{-3} with no percentage sign) (A1)(ft)(A1)(ft) (C2)

[6]

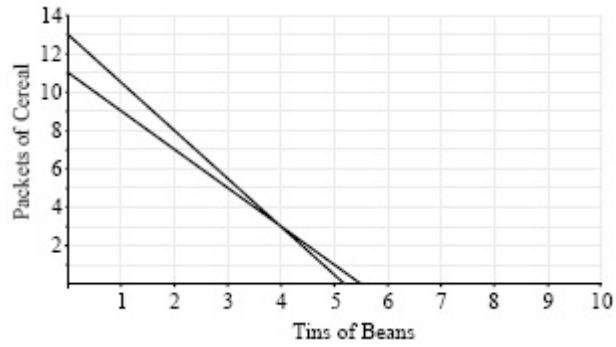
15. (a) $50b + 20c = 260$ (A1) 1

(b) $12b + 6c = 66$ (A1) 1

(c) Solve to get $b = 4$ (M1)(A1)(ft)(G2) 2

Note: (M1) for attempting to solve the equations simultaneously

(d) (i)



(A1)(A1)(A1)

*Notes: Award (A1) for labels and some idea of scale,
(A1)(ft)(A1)(ft) for each line
The axis can be reversed*

(ii) (4, 3) or (3, 4) (A1)(ft) 4

Accept $b = 4, c = 3$

[8]