PAPER F. Answers and explanations.

1. 3 325

2. 43 806

3.
$$\begin{array}{r} 2772 \\ +\ 5885 \\ \hline 8657 \end{array}$$

4. 1 523

5. 2, 3, 5, 7, 11, 13, 17, 19, 23, 29

6. (i) 58 ; (ii) 40 ; (iii) $8\frac{1}{2}$

7. (a) $\frac{2}{5}$ $\frac{6}{15} = \frac{2}{5}$

(b) 0·4

(c) 60%

8. (a) $1\frac{7}{12}$ Whole numbers: 2 – 1 = 1. Fractions: Lowest common denominator of 6 and 4 is 12.
$\frac{5}{6} - \frac{1}{4} = \frac{10}{12} - \frac{3}{12} = \frac{7}{12}$

(b) $4\frac{1}{2}$ Change to improper (top-heavy) fractions if needed. $\frac{16}{5} \times \frac{3}{4} \times \frac{15}{8} = \frac{9}{2} = 4\frac{1}{2}$

(c) $\frac{2}{3}$ $\frac{5}{8} \div \frac{15}{16} = \frac{5}{8} \times \frac{16}{15} = \frac{2}{3}$

9. 19 cm 7 days in a week ; 218 – 85 = 133 ; 133 ÷ 7 = 19

10. £152.25

11. (a) parallelogram
(b) trapezium
(c) 38° ABCDE is isosceles, so obtuse angle at E equals obtuse angle at C = 109°
Angles on a straight line = 180°, so acute angle at E is 180 – 109 = 71°
Δ ADE is isosceles so angle in Δ ADE at D also equals 71°
x = 180 – 71 – 71 = 38°

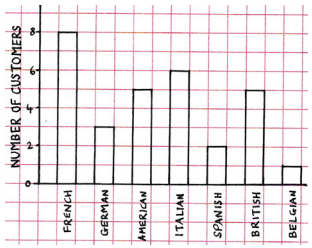
12. 58 cm Area of rectangle is 8 times area of shaded triangle 8 x 26 = 208 cm²
Longer side of rectangle is 16 cm, so shorter side is 208 ÷ 16 = 13 cm
16 + 13 + 16 + 13 = 58

13. (a) 31, 25, 19 Subtracting 6 each time
(b) 1, 3, 9 Multiplying by 3 each time

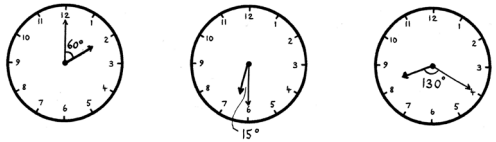
14. 270 Length of floor is 5·4 m = 540 cm. Number of tiles is 540 ÷ 30 = 18
Width of floor is 4·5 m = 450 cm. Number of tiles is 450 ÷ 30 = 15
15 x 18 = 270

15. (i) 19 (ii) $4\frac{1}{2}$ or 4·5 (iii) 23 5ab means 5 x a x b = 5 x 3 x 2 = 30

16.



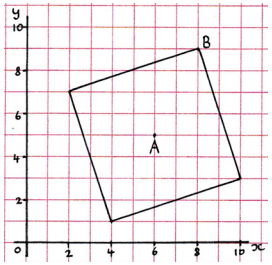
17. (a) 60° (or 300°) Each hour, the hour (small) hand moves through 360 ÷ 12 = 30°
(b) 15° (or 345°) At half past six, hour hand is half way between 6 and 7, which is 15°
(c) 130° (or 230°) At twenty past eight, minute hand points to 4; hour hand is one third of the way between 8 and 9, which is 10°



18. (a) 3 h 40 min From 10.00 a.m. (10:00) to 1.40 p.m. (13:40) is 13:40 – 10:00 = 3 h 40 min

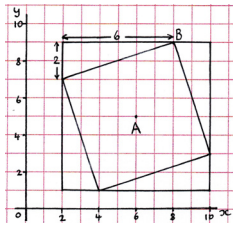
(b) 14 h 50 min Train sets off again 4 h 40 min after 1.40 p.m. which is 6.20 p.m.
From 6.20 p.m. to 6.20 a.m. on Thursday it takes 12 hours.
From 6.20 a.m. to 9.10 a.m. on Thursday it takes 2 h 50 min, so altogether the journey takes 12 hours + 2 h 50 min = 14h 50 min.

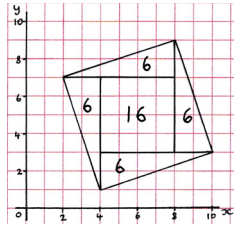
19.
(i)



(ii) 40 square units The area of the large square is 8 x 8 = 64 square units.
Each of the 4 'extra' triangles at the corners has an area of $\frac{1}{2}$ x base x height = 6.
Total area of triangles is 6 x 4 = 24, so area of original square is 64 – 24 = 40 square units.

(*or* without calculating area of large square)





20. [a] 11 ; [b] 17 ; [c] 0 ; [d] 33 — Work out brackets first (e.g. in question [b] the bracket is 7 – 1 = 6). Then do multiplication and division (if any), then addition and subtraction (if any).

21. 408 — First shell has 8 small squares; second shell has 2 x 8 = 16 squares; third shell has 3 x 8 = 24 squares, etc., so the fifty-first shell has 51 x 8 = 408 squares.

22. (a) 720 — 6! = 6 x 5 x 4 x 3 x 2 x 1 = 720
(b) 5040 — 7! = 7 x 6! = 7 x 720 = 5040
(c) 7 — 5040 ÷ 720 = 7
(d) 20 — Just as **7**! ÷ 6! = **7**, so **8**! ÷ 7! = **8**, etc.

23. (a) 40% — 100 – 25 – 35 = 40
(b) 160 — 40% of flock = 64 sheep, so 10% = 64 ÷ 4 = 16 sheep, so 100% = 160 sheep.

24. 120 kg — Rob weighs $\frac{1}{2}$ of 90 kg = 45 kg ; Lara weighs $\frac{1}{3}$ of 90 kg = 30 kg; Freddie weighs $\frac{1}{5}$ of 90 kg = 18 kg ; Kate weighs $\frac{3}{10}$ of 90 kg = 27 kg.

25. (a) $\frac{2}{5}$ — There are 10 balls altogether. 4 are yellow. Probability is $\frac{4}{10} = \frac{2}{5}$

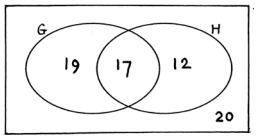
(b) $\frac{1}{3}$ — There are now only 9 balls. 3 are yellow. Probability is $\frac{3}{9} = \frac{1}{3}$

26. 1320 litres — The tank was $\frac{1}{4}$ full and is now $\frac{7}{8}$ full, so Duncan has added $\frac{7}{8} - \frac{1}{4} = \frac{5}{8}$.
$\frac{5}{8}$ of the tank = 825, so the tank holds $\frac{825}{5}$ x 8 = 1320 litres.

27. (a) 17 — 20 wore neither, so 68 – 20 = 48 wore either a hat or glasses or both.
36 + 29 = 65 wore either or both, but there were only 48 people, so 65 – 48 = 17 wore both.

(b) 12 — 29 wore a hat, but 17 of these also wore glasses. That leaves 29 – 17 = 12.

This can be shown by drawing a Venn diagram and fitting the numbers in.



28. (a) 9
(b) 170 — Number of diagonals in a 20-sided figure is $\frac{20(20-3)}{2} = \frac{20 \times 17}{2} = \frac{340}{2} = 170$
(c) 10 — $\frac{x(x-3)}{2} = 35$; $x^2 - 3x = 70$; 100 – 30 = 70

29. 14 — 10 layers would be 75 x 10 = 750 mm high. Another 3 layers (13 layers) would be 975 mm high, but this would not quite be 1 metre, so 14 layers would be needed.

30. 4567 — The number is prime, so it cannot be 1234 or 3456 or 5678 because they divide by 2.
It cannot be 0123 or 6789 because they divide by 3.
It cannot be 2345 because it divides by 5.
4567 is the only four-digit consecutive combination which is also a prime number.
(None of the reverse consecutives is prime either, e.g. 9876, 6543, 3210, etc.)

PAPER G. Answers and explanations.

1. 3333

2. 888

3. 3456

4. 444

5. 60 070

6. P 11·50 , Q 12·75 , R 13·25 — Each square is one quarter (or 0·25)

7. (a) x , + (b) ÷ , –

8. (a) $\frac{2}{5}$ (b) $\frac{5}{12}$ — 12 is lowest common denominator : $\frac{6+8-9}{12} = \frac{5}{12}$

9. £4 500

10. 100·899

$$\begin{array}{rr} & 0\cdot 0\,0\,9 \\ & 9\cdot \\ & 0\cdot 9 \\ + & 0\cdot 9\,9 \\ & 9\,0\cdot \\ \hline & 1\,0\,0\cdot 8\,9\,9 \end{array}$$

11. (a) 36 cm
(b) 27 cm² — Area of rectangle is 12 x 6 = 72 cm². Area of bottom left-hand triangle is 36 cm².
Area of top right-hand Δ is $\frac{6 \times 3}{2} = 9$ cm². Area of shaded part is 36 – 9 = 27 cm².

12. 0·88 , $\frac{7}{8}$, 86% , $\frac{6}{7}$, 0·8 — Change fractions and percentages to decimals. Then compare sizes.

13. 77° — All the way round is 360°. 360 – 52 = 308 ; 308 ÷ 4 = 77°

14. (a) 8 cm³ — 4 x 2 x 1 = 8
(b) 216 cm³ — 12 x 6 x 3 = 216
(c) 1 : 27 — 216 ÷ 8 = 27

15. 53p or £0.53 — Total purchases £5.47 ; 6.00 – 5.47 = 0.53

16.

6	7	2
1	5	9
8	3	4