BUMPER

"BETWEEN PAPERS 2 and 3" PRACTICE PAPER (Q33 to Q65)

HIGHER TIER (Summer 2017)

QUESTIONS

Not A "best" Guess paper.

Neither is it a "prediction" ... only the examiners know what is going to come up! Fact!
You also need to REMEMBER that just because a topic came up on paper 1 or Paper 2 it may still come up on paper 3
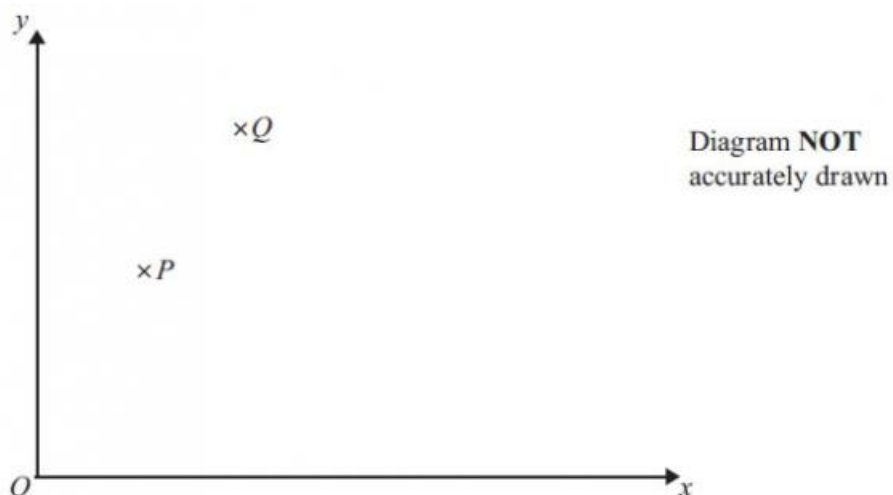
We know how important it is to practise, practise, practise .... so we've collated a load of questions that weren't examined in the Pearson/edexcel NEW 9-1 GCSE Maths paper 1 and paper 2 but we cannot guarantee how a topic will be examined in the final paper
Enjoy!

Mel & Seager

NB: Some of these questions may have also been included in the papers used between papers 1 and 2 ... the practise is good for you!

	Marks	Actual	😠 😐 😀
Q33. Vectors	5		
Q34. Enlargements	3		
Q35. Volume/Area Similarity	5		
Q36. Volume/Area Similarity	4		
Q37. Circle theorems	4		
Q38. Inequalities	2		
Q39. Inequalities	4		
Q40. Inequalities	4		
Q41. Inequalities & regions	4		
Q42. Solving equations & inequalities	8		
Q43. Bounds	4		
Q44. Cubic graphs	4		
Q45. Spheres	4		
Q46. Bounds	4		
Q47. Cylinders & cones	5		
Q48. Similar shapes (focus on area/vol)	5		
Q49. Similar shapes (focus on area/vol)	4		
Q50. Circles / Similarity	2		
Q51. Forming quadratics	5		
Q52. Venn diagrams	4		
Q53. Venn diagrams	4		
Q54. Venn diagrams	5		
Q55. Venn diagrams	4		
Q56. Angle facts	4		
Q57. Fractions	4		
Q58. Angles facts	4		
Q59. Best Value	3		
Q60. Exchange rates	5		
Q61. Algebraic reasoning	3		
Q62. Functions	5		
Q63. Quadratics	4		
Q64. Area under curve	5		
Q65. Iteration	6		

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The diagram is a sketch.

P is the point (2, 4)
Q is the point (4, 8)

(a) Find the vector $\overrightarrow{PQ}$

   Give your answer as a column vector

(2)

$$\overrightarrow{QR} = \begin{pmatrix} 6 \\ -4 \end{pmatrix}$$

M is the midpoint of *PQ*.
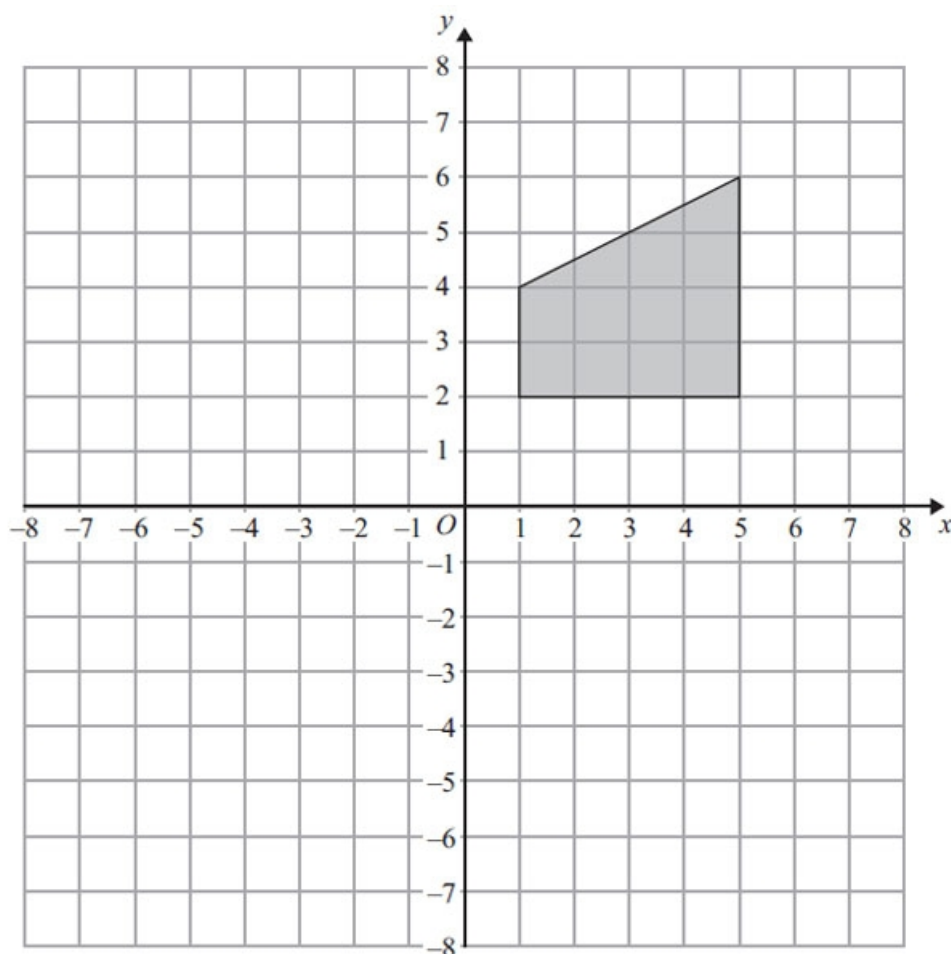*N* is the midpoint of *QR*.

(b) Find the vector $\overrightarrow{MN}$

   Give your answer as a column vector

(3)

(Total for Question is 5 marks)

Enlarge the shaded shape by scale factor − ½ with centre (−1, −2).

(Total for Question is 3 marks)

Q35. Ali has two solid cones made from the same type of metal.
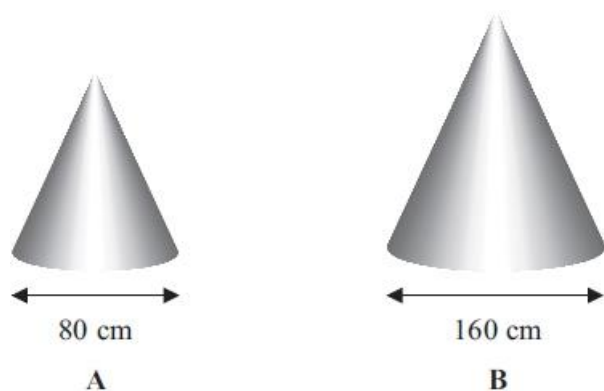

80 cm

A

160 cm

B

Diagram **NOT** accurately drawn

The two solid cones are mathematically similar.
The base of cone **A** is a circle with diameter 80 cm.
The base of cone **B** is a circle with diameter 160 cm.

Ali uses 80 ml of paint to paint cone **A**.
Ali is going to paint cone **B**.

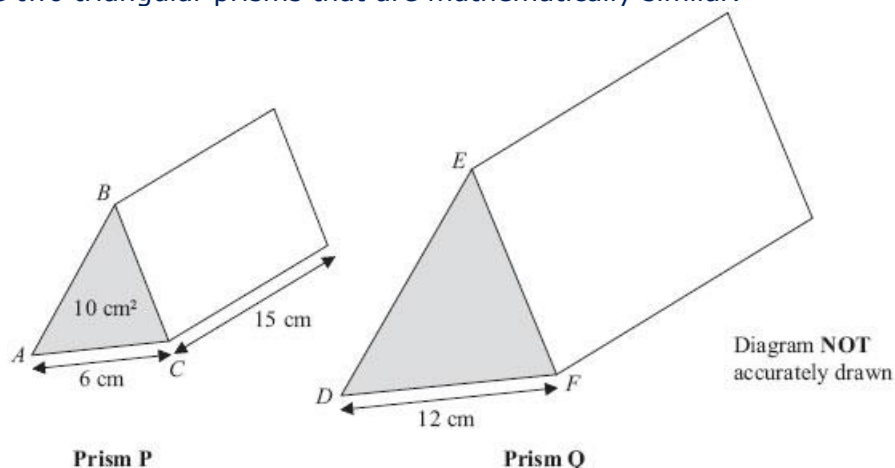(a) Work out how much paint, in ml, he will need.

. . . . m/ **(2)**

The volume of cone **A** is 171 700 cm^3.

(b) Work out the volume of cone **B**.

. . . . cm^3 **(3)**

(Total for Question is 5 marks)

Q36. P and **Q** are two triangular prisms that are mathematically similar.

Diagram **NOT** accurately drawn

Prism P   Prism Q

Prism **P** has triangle *ABC* as its cross section.
Prism **Q** has triangle *DEF* as its cross section.
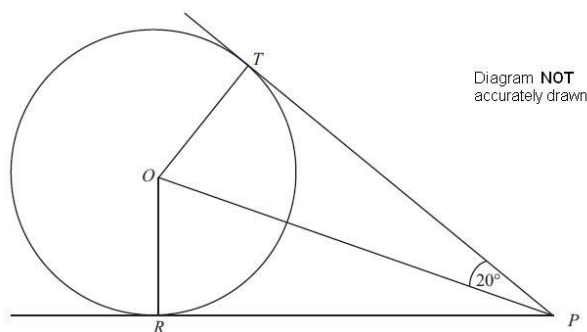
AC = 6 cm
DF = 12 cm

The area of the cross section of prism **P** is 10 cm^2.
The length of prism **P** is 15 cm.

Work out the volume of prism **Q**.

(Total for Question is 4 marks)

Q37.

Diagram **NOT** accurately drawn

T and *R* are two points on a circle centre *O*.

PT and *PR* are the tangents to the circle from *P*.

Angle *TPO* = 20°.

Work out the size of angle *TOR*.
You must give reasons for each stage of your working.

(Total for Question is 4 marks)
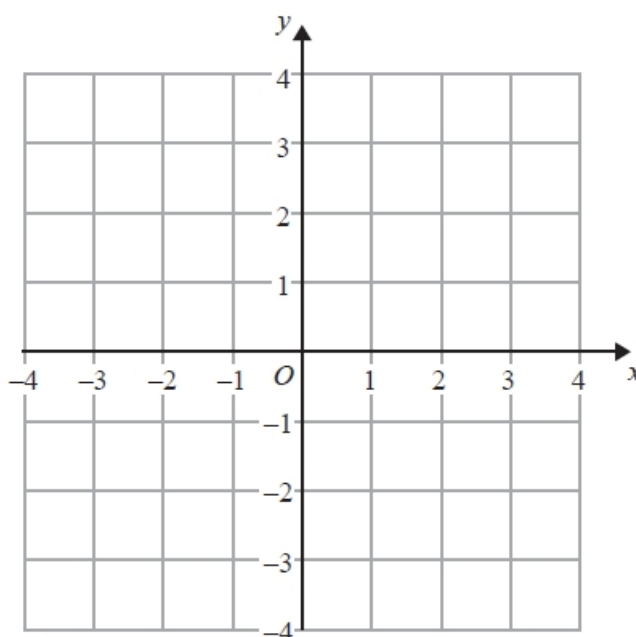
Q38. Solve the inequality $3 - \frac{1}{2}x > x$

....

(Total for question = 2 marks)

Q39. (a) Solve the inequality $5e + 3 > e + 12$

....(2)

(b) On the grid, shade the region defined by the inequality $x + y > 1$

(2)
(Total for Question is 4 marks)

Q40. *m* is an integer such that $-2 < m \leq 3$

(a) Write down all the possible values of *m*.

(2)

(b) Solve $7x - 9 < 3x + 4$

(2)

(Total for Question is 4 marks)
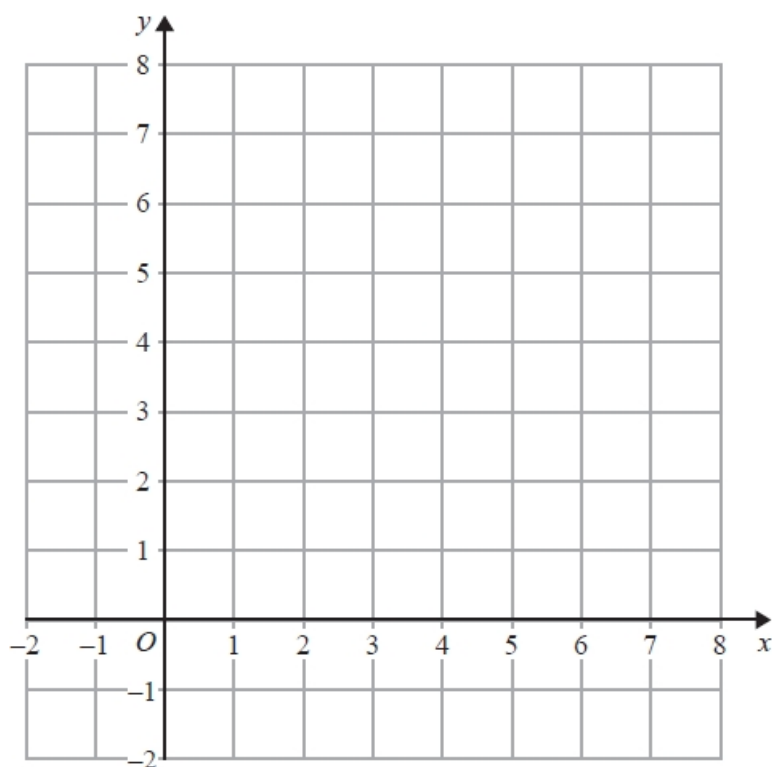
Q41. On the grid show, by shading, the region that satisfies all three of the inequalities

$$x + y < 7 \qquad\qquad y < 2x \qquad\qquad y > 3$$

Label the region **R**.

(Total for question = 4 marks)

Q42. $k = 3e + 5$

(a) Work out the value of *k* when $e = -2$

(2)

(b) Solve $4y + 3 = 2y + 14$

$y = \text{.....................}$ **(2)**

(c) Solve $3(x - 5) = 21$

$x =$. . . . . **(2)**

$-3 < n < 4$
n is an integer.

(d) Write down all the possible values of n.

(2)

(Total for Question is 8 marks)

Q43. Dan does an experiment to find the value of π.

He measures the circumference and the diameter of a circle.

He measures the circumference, C, as 170 mm to the nearest millimetre.
He measures the diameter, d, as 54 mm to the nearest millimetre.

Dan uses $\pi = {}^{C}/_{d}$ to find the value of π.

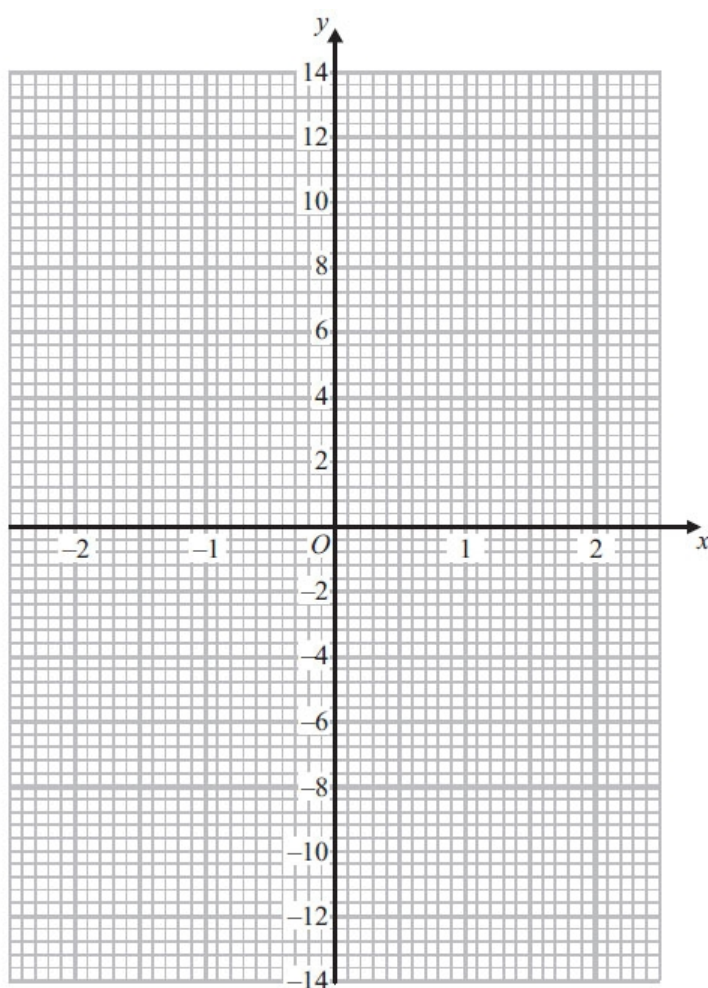Calculate the upper bound and the lower bound for Dan's value of π.

(Total for Question is 4 marks)

Q44. (a) Complete this table of values for $y = x^3 + 2x - 1$

x	-2	-1	0	1	2
y		-4			11

(2)

(b) On the grid, draw the graph of $y = x^3 + 2x - 1$

(2)

Total for Question is 4 marks)

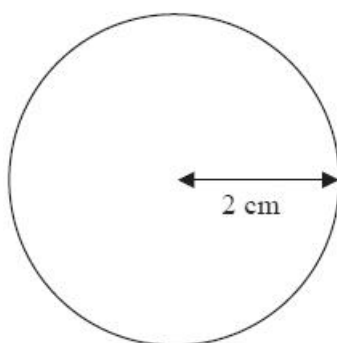**Q45.** The diagram shows a solid wooden sphere.

Diagram **NOT**
accurately drawn

2 cm

The radius of the sphere is 2 cm.
The mass of the sphere is 45 grams.

Wood will float on the Dead Sea only when the density of the wood is less than 1.24 g/cm^3.

Will this wooden sphere float on the Dead Sea?

(Total for Question is 4 marks)

Q46. Steve travelled from Ashton to Barnfield.

He travelled 235 miles, correct to the nearest 5 miles.
The journey took him 200 minutes, correct to the nearest 5 minutes.

Calculate the lower bound for the average speed of the journey.
Give your answer in **miles per hour**, correct to 3 significant figures.
You must show all your working.

.... mph

(Total for question = 4 marks)
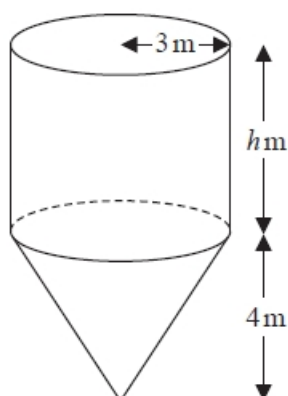
Q47. The diagram shows a container for grain.

Diagram **NOT** accurately drawn

The container is a cylinder on top of a cone.
The cylinder has a radius of 3m and a height of *h*m.
The cone has a base radius of 3m and a vertical height of 4m.

The container is empty.
The container is then filled with grain at a constant rate.

After 5 hours the depth of the grain is 6 metres above the vertex of the cone.
After 9 hours the container is full of grain.

Work out the value of *h*.
Give your answer as a fraction in its simplest form.
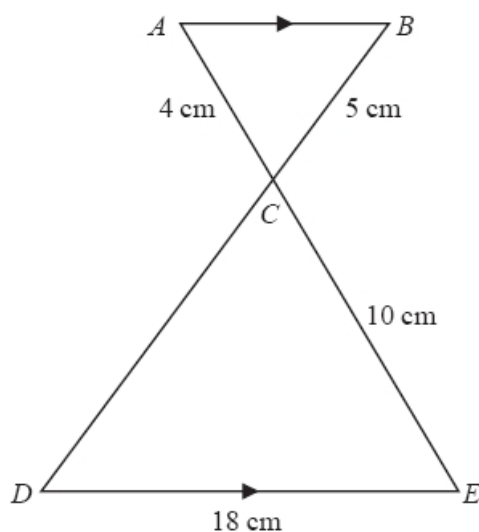You must show all your working.

....

(Total for question = 5 marks)

Diagram **NOT** accurately drawn

ACE and *BCD* are straight lines.
AB is parallel to *DE*.

(a) Calculate the length of *CD*.

.... cm **(2)**

(b) Calculate the length of *AB*.

.... cm **(2)**

The area of triangle *ABC* = *T* cm^2
(c) Find the area of triangle *CDE* in terms of *T*.

.... cm^2 **(1)**

(Total for question = 5 marks)

Q49. Triangles *ABC* and *ACD* are similar.
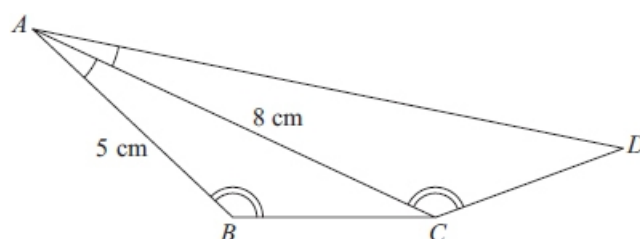
Diagram **NOT** accurately drawn

Angle *BAC* = angle *CAD*.
 Angle *ABC* = angle *ACD*.
AB = 5 cm and *AC* = 8 cm.
(a) Calculate the length of *AD*.

....cm **(2)**

The area of triangle *ABC* is 12 cm^2
(b) Calculate the area of triangle *ACD*.

....cm^2 **(2)**
(Total for question = 4 marks)

Q50. *PTR* and *QTS* are chords of a circle.
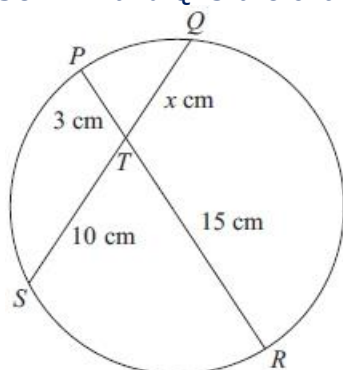
Diagram **NOT**
accurately drawn

PT = 3 cm.
ST = 10 cm.
RT = 15 cm.
QT = x cm.

Calculate the value of *x*.

x = ...

(Total for question = 2 marks)

Q51. A bag contains *x* counters.

7 of the counters are blue.
Sam takes at random a counter from the bag and does not replace it.
Jill then takes a counter from the bag.
The probability they both take a blue counter is 0.2

(a) Form an equation involving *x*.

Show that your equation can be expressed as $x^2 - x - 210 = 0$

(2)

Calculate the value of *x*.

x = ... **(3)**
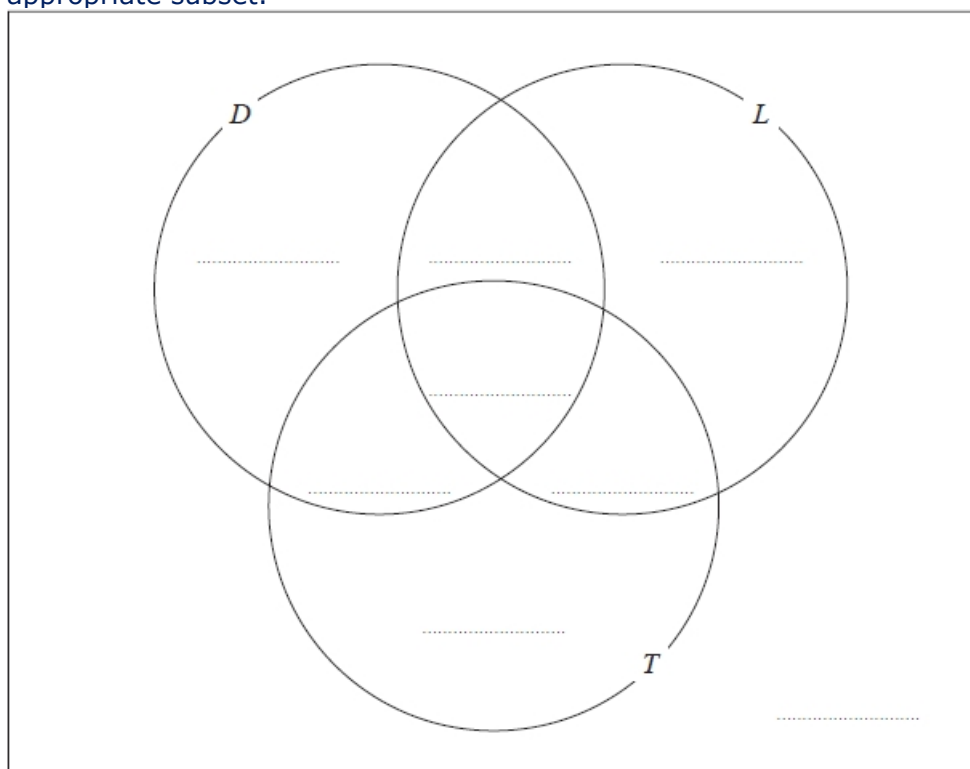
(Total for question = 5 marks)

Q52. Each student in a group of 32 students was asked the following question.

"Do you have a desktop computer (*D*), a laptop (*L*) or a tablet (*T*)?"

Their answers showed that

19 students have a desktop computer
17 students have a laptop
16 students have a tablet
9 students have both a desktop computer and a laptop
11 students have both a desktop computer and a tablet
7 students have both a laptop and a tablet
5 students have all three.

(a) Using this information, complete the Venn diagram to show the number of students in each appropriate subset.

D   *L*

T

(3)
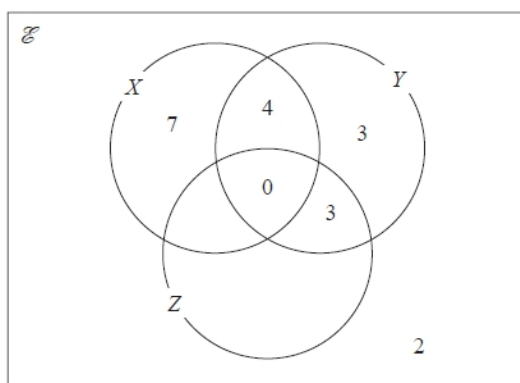
One of the students with both a desktop computer and a laptop is chosen at random.

(b) Find the probability that this student also has a tablet.

.... **(1)**

(Total for question = 4 marks)

Q53. The Venn diagram shows a universal set $\mathcal{E}$ and three sets X, Y and Z.

The numbers shown represent **numbers** of elements.

n(X') = 14
n(Z) = 14

(a) Complete the Venn diagram.

(2)

(b) Find the value of

(i) n($X \cup Z$)

....

(ii) n($X \cap Y'$)

....

(2)
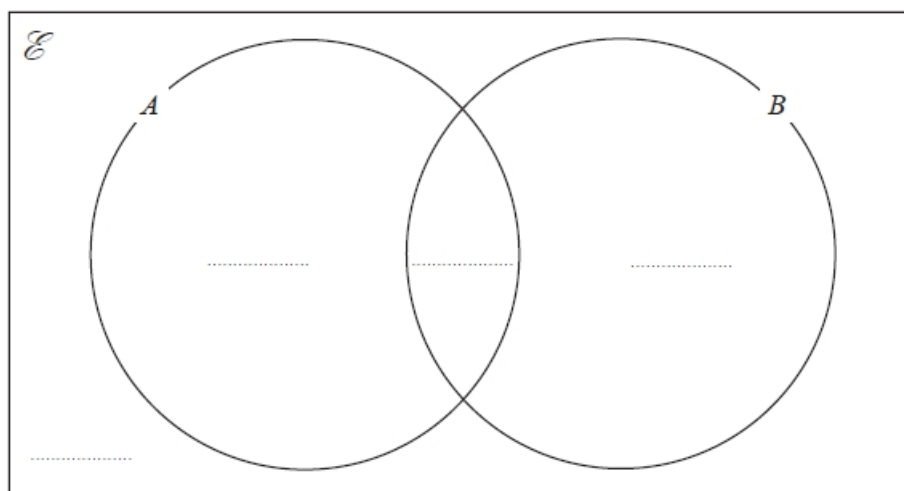**(Total for question = 4 marks)**

Q54. A and B are two sets.

n($\mathcal{E}$) = 36

n(B) = 21

n($A \cap B$) = 8

n(A') = 18

(a) Complete the Venn diagram to show the **number of elements** in each region of the Venn diagram.

(3)

(b) Find n(A∪B)

(1)

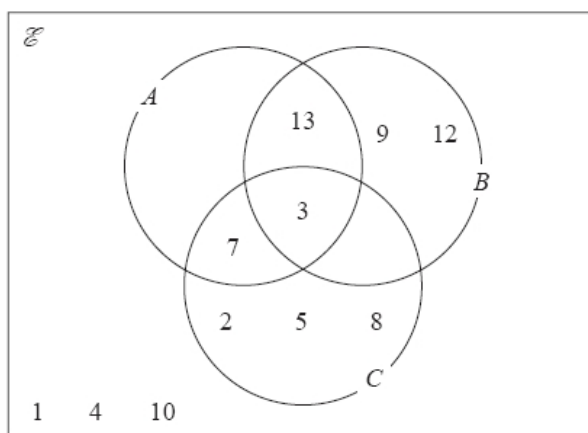(c) Find n(A∩B')

(1)
(Total for question = 5 marks)

Q55. $\mathscr{E}$ = 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13

A = 3, 7, 11, 13
B = 3, 6, 9, 12, 13
C = 2, 3, 5, 6, 7, 8

(a) Complete the Venn diagram.

(1)

(b) List the members of the set $B' \cap C$

(1)

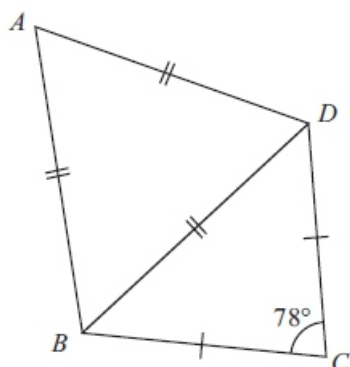(c) List the members of the set $(A \cup C)' \cap B$

(1)

(d) Find $n(A' \cap B')$

(1)
(Total for question = 4 marks)

Q56.

Diagram **NOT** accurately drawn

The diagram shows a quadrilateral *ABCD*.
AB = BD = AD.
CB = CD.
Angle *BCD* = 78°
Work out the size of angle *ABC*.

.... °

(Total for question is 4 marks)

Q57. (a) Work out $2\frac{1}{4} \times 3\frac{1}{3}$

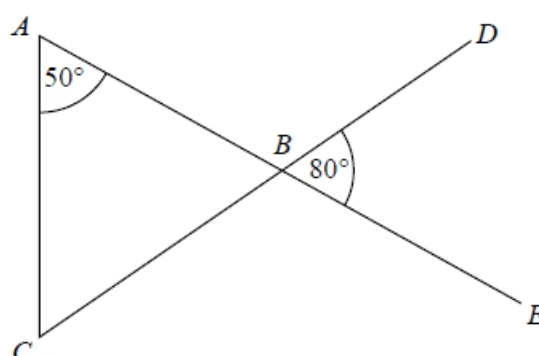Give your answer as a mixed number in its simplest form.

.... **(3)**

(b) Write the numbers 3, 4, 5 and 6 in the boxes to give the greatest possible total.
You may write each number only once.

$$\boxed{}\frac{1}{\boxed{}} + \boxed{}\frac{2}{\boxed{}}$$

(1)
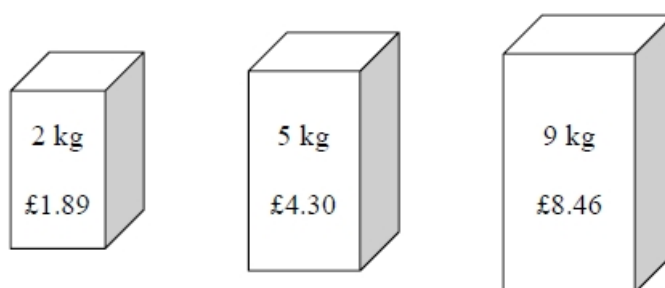
(Total for question = 4 marks)

Q58.

ABE and *CBD* are straight lines.

Show that triangle *ABC* is an isosceles triangle.
Give a reason for each stage of your working.

(Total for question = 4 marks)

Q59. Soap powder is sold in three sizes of box.

A 2 kg box of soap powder costs £1.89
A 5 kg box of soap powder costs £4.30
A 9 kg box of soap powder costs £8.46

Which size of box of soap powder is the best value for money?
You must show how you get your answer.

(Total for question = 3 marks)

Q60. Asif is going on holiday to Turkey.

The exchange rate is £1 = 3.5601 lira.

Asif changes £550 to lira.

(a) Work out how many lira he should get.
Give your answer to the nearest lira.

.... lira **(2)**

Asif sees a pair of shoes in Turkey.
The shoes cost 210 lira.

Asif does not have a calculator.
He uses £2 = 7 lira to work out the approximate cost of the shoes in pounds.

(b) Use £2 = 7 lira to show that the approximate cost of the shoes is £60

(2)

(c) Is using £2 = 7 lira instead of using £1 = 3.5601 lira a sensible start to Asif's method to work out the cost of the shoes in pounds?

You must give a reason for your answer.

(1)
(Total for question = 5 marks)

Q61. Given that $3(x - c) = 2x + 5$ where c is an integer, show that x cannot be a multiple of six.

(Total for question = 3 marks)

Q62. The functions f and g are such that

$$f(x) = 1 - 5x \quad \text{and} \quad g(x) = 1 + 5x$$

(a) Show that gf(1) = − 19

(2)

(b) Prove that $f^{-1}(x) + g^{-1}(x) = 0$ for all values of x.

(3)
(Total for question = 5 marks)

Q63. (a) Write $2x^2 + 16x + 35$ in the form $a(x + b)^2 + c$ where a, b, and c are integers.
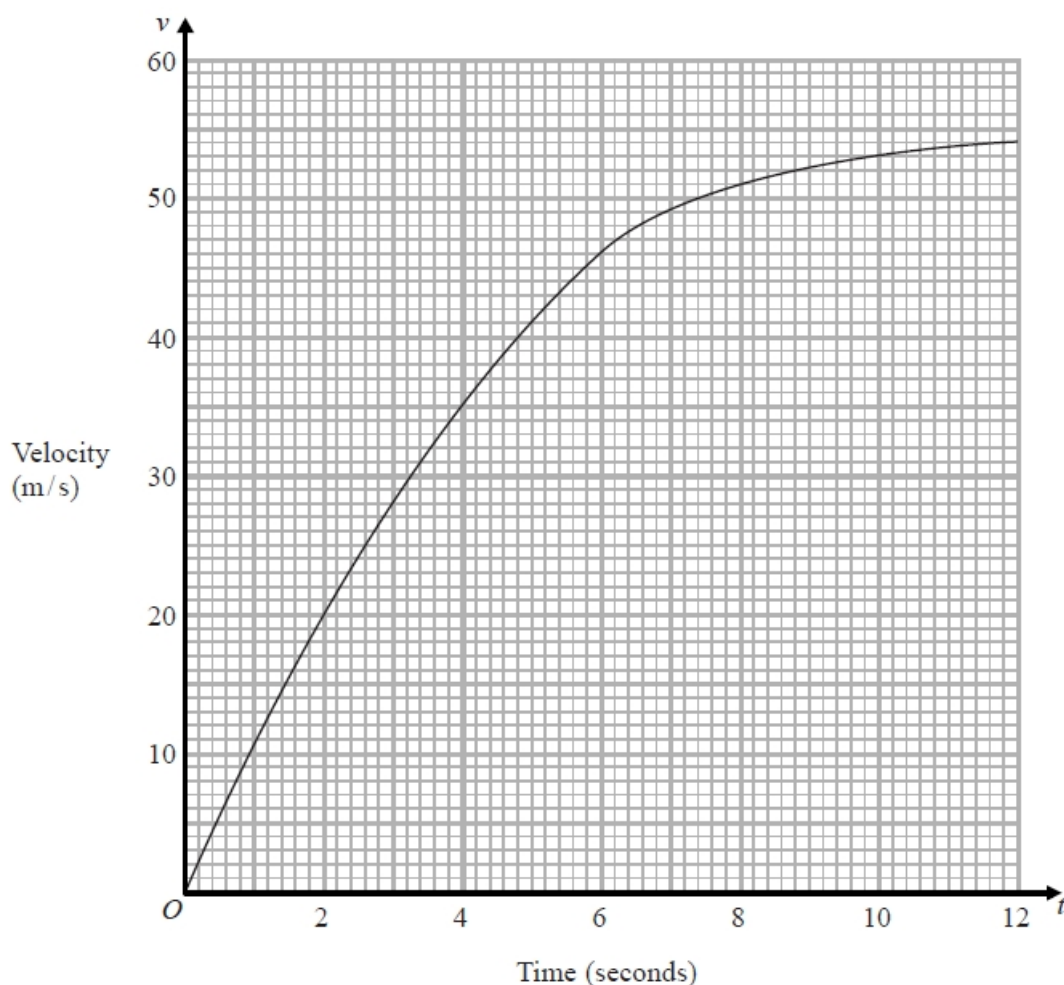
(3)

(b) Hence, or otherwise, write down the coordinates of the turning point of the graph of $y = 2x^2 + 16x + 35$

(1)
(Total for question = 4 marks)

Q64. The graph shows information about the velocity, v m/s, of a parachutist t seconds after leaving a plane.

(a) Work out an estimate for the acceleration of the parachutist at t = 6

.... m/s² **(2)**

(b) Work out an estimate for the distance fallen by the parachutist in the first 12 seconds after leaving the plane.
Use 3 strips of equal width.

.... m **(3)**

(Total for question is 5 marks)

Q65. (a) Show that the equation $x^3 + 4x = 1$ has a solution between $x = 0$ and $x = 1$

(2)

(b) Show that the equation $x^3 + 4x = 1$ can be arranged to give $x = \dfrac{1}{4} - \dfrac{x^3}{4}$

(1)

(c) Starting with $x_0 = 0$, use the iteration formula $x_{n+1} = \dfrac{1}{4} - \dfrac{x_n^3}{4}$ twice, to find an estimate for the solution of $x^3 + 4x = 1$

.... **(3)**

(Total for question = 6 marks)