

Dr Oliver Mathematics
GCSE Mathematics
2009 June Paper 3H: Non-Calculator
1 hour 45 minutes

The total number of marks available is 100.

You must write down all the stages in your working.

1. The two-way table gives some information about how 100 children travelled to school one day.

	Walk	Car	Other	Total
Boy	15		14	54
Girl		8	16	
Total	37			100

- (a) Complete the two-way table. (3)

One of the children is picked at random.

- (b) Write down the probability that this child walked to school that day. (1)

2. (a) Simplify $4x + 3y - 2x + 5y$. (2)

Compasses cost c pence each.

Rulers cost r pence each.

- (b) Write down an expression for the total cost, in pence, of 2 compasses and 4 rulers. (2)

3. (a) Complete the table of values for $y = 4x - 3$. (2)

x	-2	-1	0	1	2	3
y	-11		-3			9

- (b) On the grid, draw the graph of $y = 4x - 3$, for values of x from -2 to 3 . (2)

4. $P = 4k - 10$.

$$P = 50.$$

- (a) Work out the value of k . (2)

$$y = 4n - 3d.$$

$$n = 2.$$

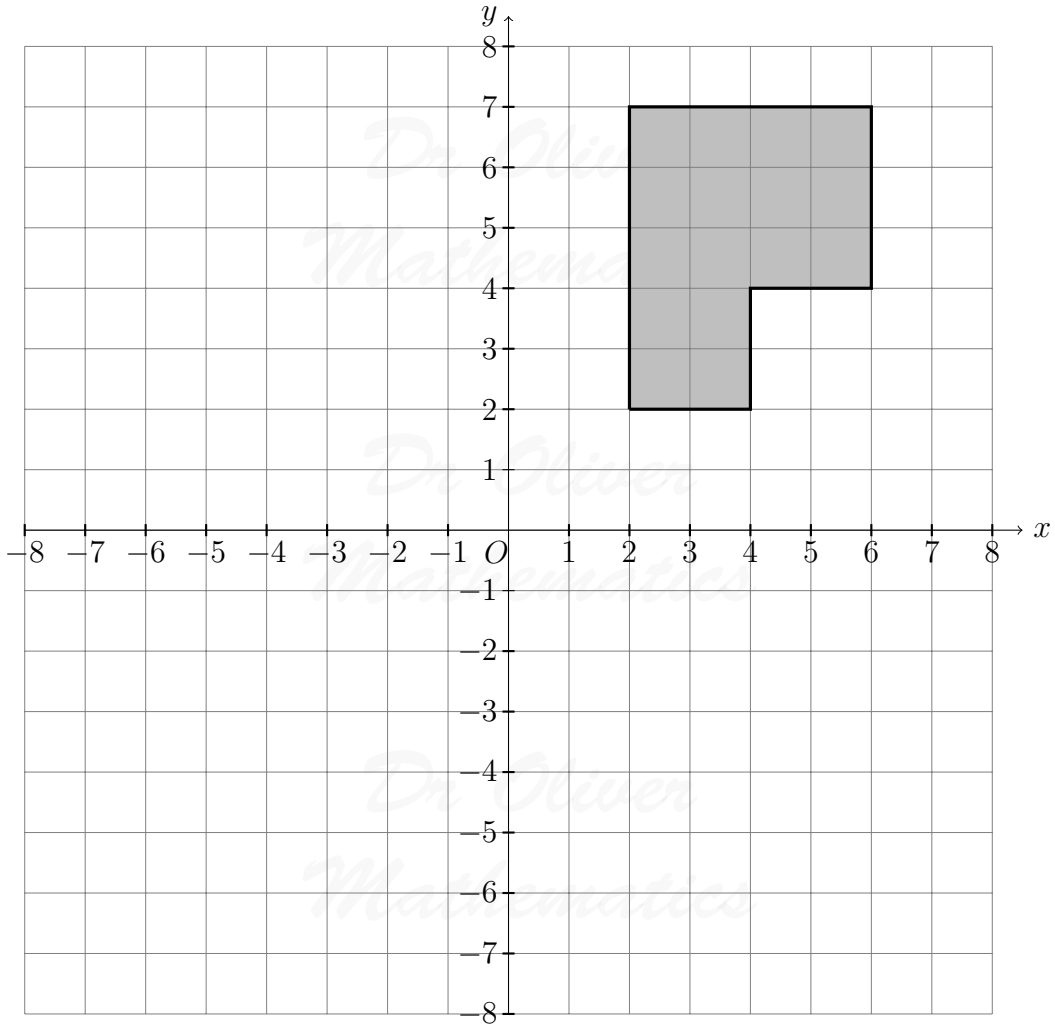
$$d = 5.$$

(b) Work out the value of y .

(2)

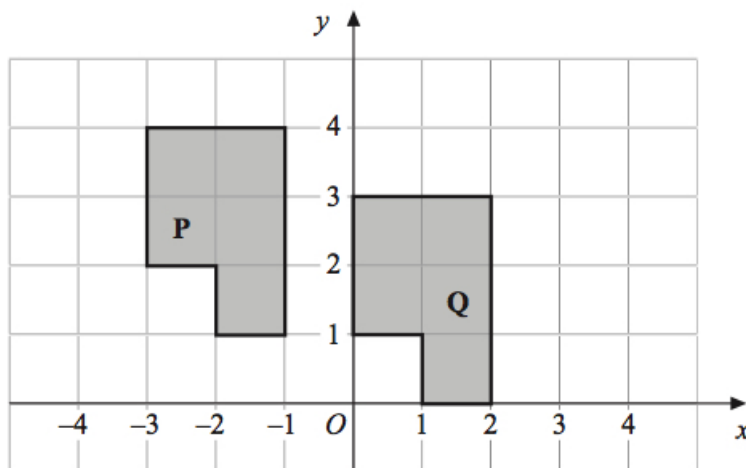
5. (a) Rotate the shaded shape 90° clockwise about the point O .

(2)

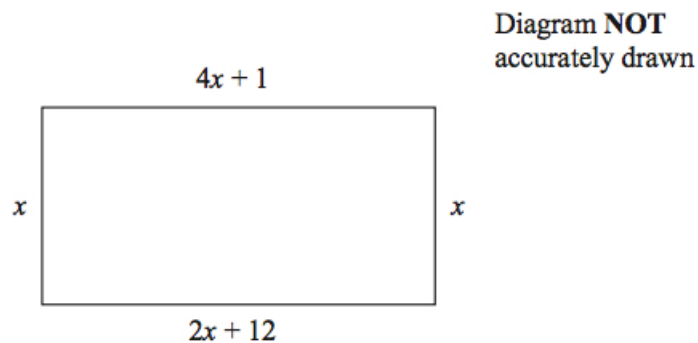


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- (b) Describe fully the single transformation that will map shape **P** onto shape **Q**. (2)
6. The diagram shows a rectangle.
All the measurements are in centimetres.



- (a) Explain why $4x + 1 = 2x + 12$. (1)
- (b) Solve $4x + 1 = 2x + 12$. (2)
- (c) Use your answer to part (b) to work out the perimeter of the rectangle. (2)
7. Use the information that

$$322 \times 48 = 15\,456$$

to find the value of

- (a) 3.22×4.8 , (1)
- (b) 0.322×0.48 , (1)

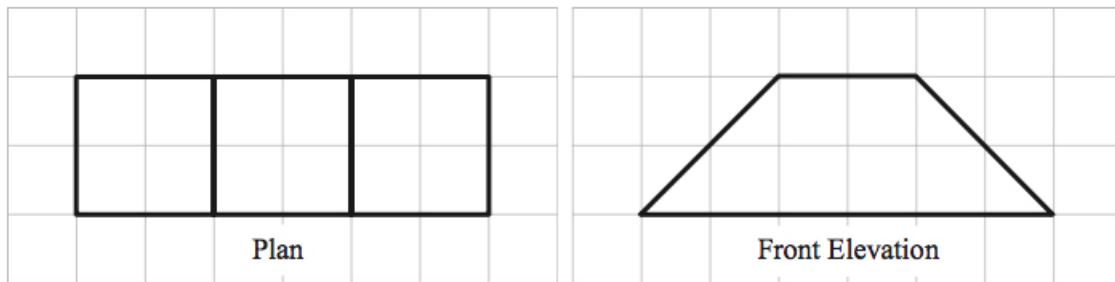
(c) $15\,456 \div 4.8$. (1)

8. $2x^2 = 72$.

(a) Find a value of x . (2)

(b) Express 72 as a product of its prime factors. (2)

9. Here are the plan and front elevation of a solid shape.



(a) On the grid below, draw the side elevation of the solid shape. (2)



(b) Draw a sketch of the solid shape. (2)

10. There are 40 litres of water in a barrel. (3)

The water flows out of the barrel at a rate of 125 millilitres per second.

1 litre equals 1000 millilitres.

Work out the time it takes for the barrel to empty completely.

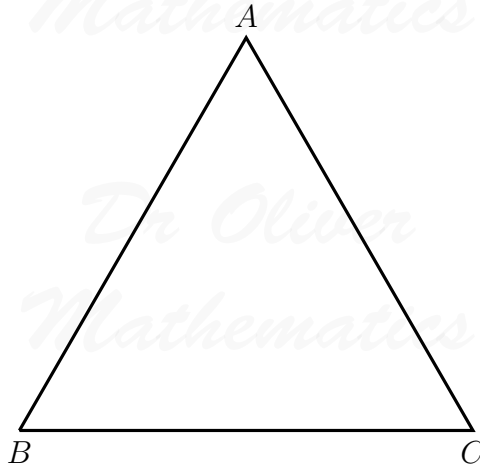
11. The length of a line is 63 centimetres, correct to the nearest centimetre.

(a) Write down the **least** possible length of the line. (1)

(b) Write down the **greatest** possible length of the line. (1)

12. ABC is a triangle.

(4)



Shade the region inside the triangle which is both less than 4 centimetres from the point B and closer to the line AC than the line AB .

13. Fred is going to take a survey of the magazines read by students.
He wants to design a questionnaire.

(a) Design a suitable question that he could use to find out what types of magazine students read. (2)

Fred put the question below on his questionnaire.
‘How many magazines have you read?’



A few



A lot

(b) Design a better question. (2)
You should include some response boxes.

14. Work out an estimate for the value of

(3)

$$\frac{6.8 \times 191}{0.051}$$

15. (a) Write 64 000 in standard form.

(1)

(b) Write 156×10^{-7} in standard form.

(1)

16. (a) Factorise fully $4x^2 - 6xy$. (2)

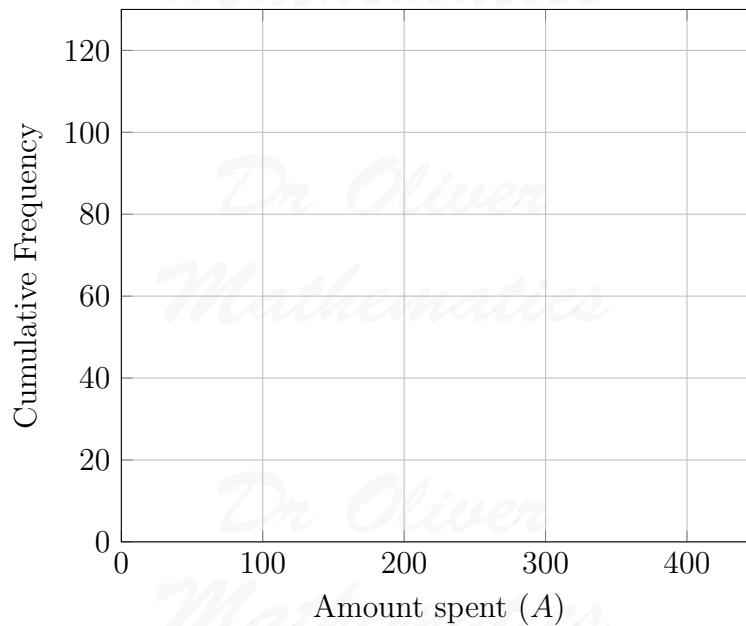
(b) Factorise $x^2 + 5x - 6$. (2)

17. Lucy did a survey about the amounts of money spent by 120 men during their summer holidays.

The cumulative frequency table gives some information about the amounts of money spent by the 120 men.

Amount (£A) spent	Cumulative frequency
$0 \leq A < 100$	13
$0 \leq A < 150$	25
$0 \leq A < 200$	42
$0 \leq A < 250$	64
$0 \leq A < 300$	93
$0 \leq A < 350$	110
$0 \leq A < 400$	120

(a) On the grid, draw a cumulative frequency diagram. (2)



(b) Use your cumulative frequency diagram to estimate the median. (2)

A survey of the amounts of money spent by 200 women during their summer holidays gave a median of £205.

(c) Compare the amounts of money spent by the women with the amounts of money spent by the men. (1)

18. The diagram shows a circle centre O .
 A , B , and C are points on the circumference.

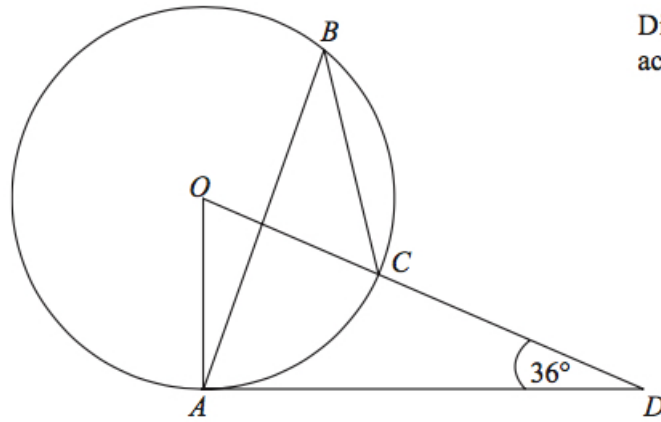


Diagram **NOT**
 accurately drawn

DCO is a straight line.

DA is a tangent to the circle.

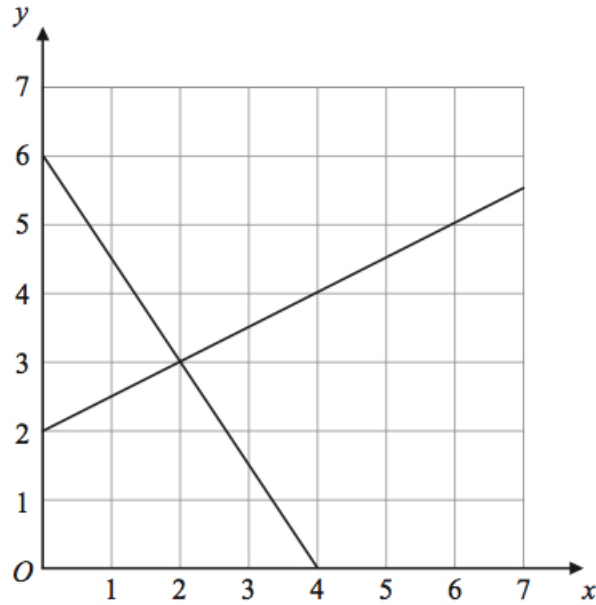
Angle $ADO = 36^\circ$.

- (a) Work out the size of angle AOD . (2)
- (b) (i) Work out the size of angle ABC . (3)
- (ii) Give a reason for your answer.
19. The diagram shows graphs of

$$y = \frac{1}{2}x + 2$$

and

$$2y + 3x = 12.$$



- (a) Use the diagram to solve the simultaneous equations (1)

$$y = \frac{1}{2}x + 2$$

$$2y + 3x = 12.$$

- (b) Find an equation of the straight line which is parallel to the line $y = \frac{1}{2}x + 2$ and passes through the point $(0, 4)$. (2)

20. (a) Solve the inequality (2)

$$3t + 1 < t + 12.$$

- (b) t is a whole number. (1)

Write down the largest value of t that satisfies

$$3t + 1 < t + 12.$$

21. M is directly proportional to L^3 . (4)

When $L = 2$, $M = 160$.

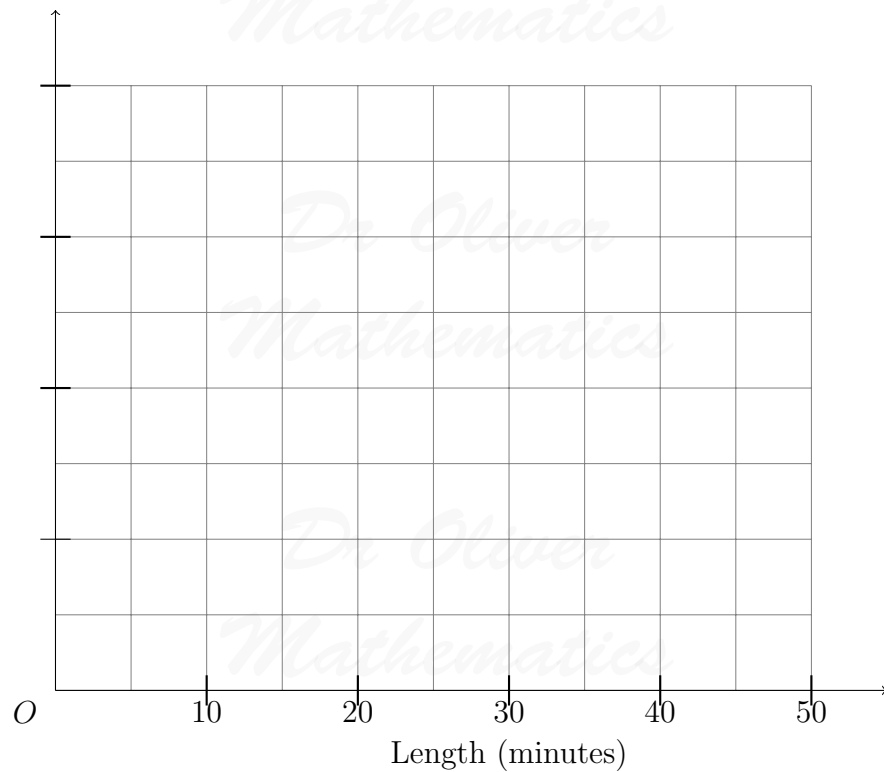
Find the value of M when $L = 3$.

22. A call centre receives 64 telephone calls one morning. (4)

The table gives information about the lengths, in minutes, of these telephone calls.

Length (x) minutes	Frequency
$0 < x \leq 5$	14
$5 < x \leq 15$	10
$15 < x \leq 30$	24
$30 < x \leq 40$	20
$40 < x \leq 45$	6

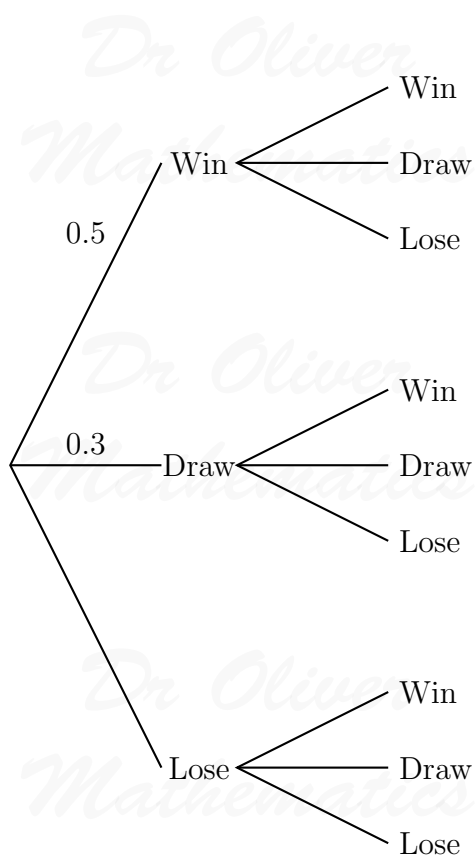
Draw a histogram for this information.



23. In a game of chess, a player can either win, draw, or lose.
 The probability that Vishi wins any game of chess is 0.5.
 The probability that Vishi draws any game of chess is 0.3.
 Vishi plays 2 games of chess.

(a) Complete the probability tree diagram.

(2)



(b) Work out the probability that Vishi will win both games.

(2)

24. ABC is an equilateral triangle.

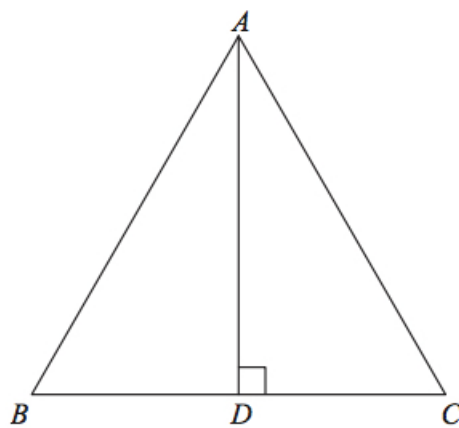


Diagram NOT accurately drawn

D lies on BC .

AD is perpendicular to BC .

(a) Prove that triangle ADC is congruent to triangle ADB .

(3)

(b) Hence, prove that $BD = \frac{1}{2}AB$. (2)

25.

$$\frac{1}{u} + \frac{1}{v} = \frac{1}{f}.$$

$$u = 2\frac{1}{2} \text{ and } v = 3\frac{1}{3}.$$

(a) Find the value of f . (3)

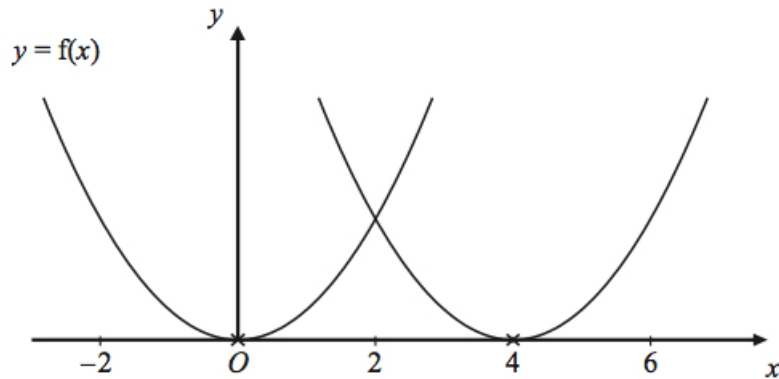
(b) Rearrange (2)

$$\frac{1}{u} + \frac{1}{v} = \frac{1}{f}$$

to make u the subject of the formula.

Give your answer in its simplest form.

26. The curve with equation $y = f(x)$ is translated so that the point at $(0, 0)$ is mapped onto the point $(4, 0)$.

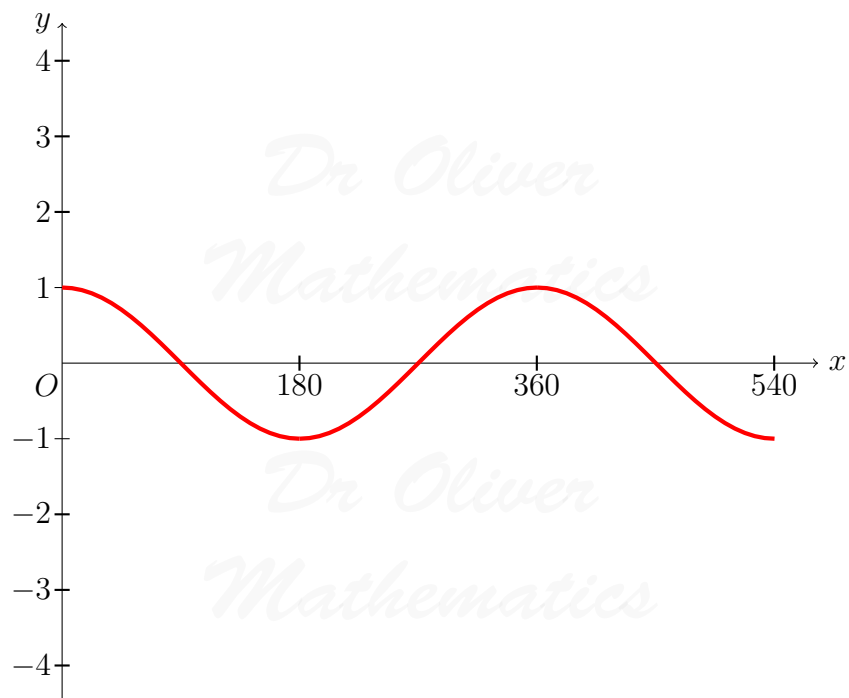


(a) Find an equation of the translated curve. (2)

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The grid shows the graph of $y = \cos x^\circ$ for values of x from 0 to 540.



(b) On the grid, sketch the graph of $y = 3 \cos(2x^\circ)$ for values of x from 0 to 540.

(2)

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