

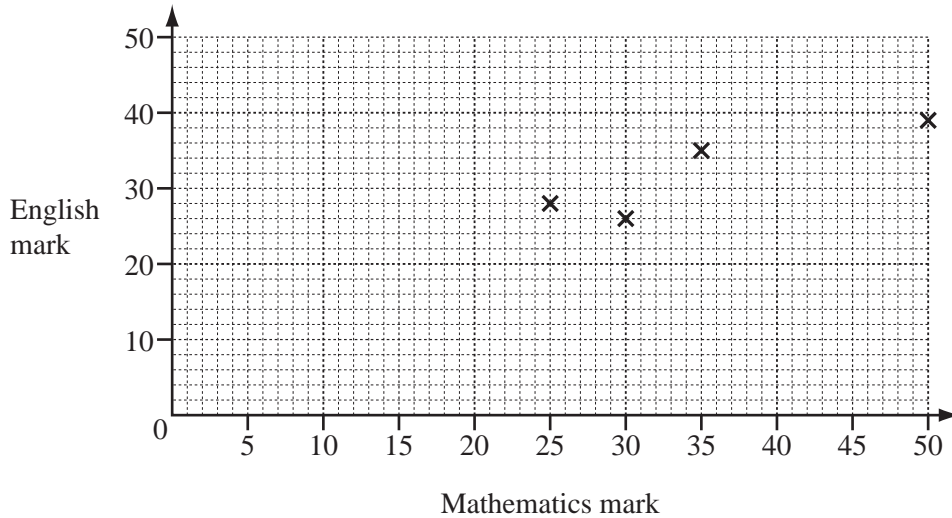
1

Mathematics mark	30	50	35	25	5	39	48	40	10	15
English mark	26	39	35	28	9	37	45	33	16	12

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The table shows the test marks in Mathematics and English for 10 students.

- (a) (i) On the grid, complete the scatter diagram to show the Mathematics and English marks for the 10 students. The first four points have been plotted for you.



- (ii) What type of correlation does your scatter diagram show? [2]

Answer(a)(ii) [1]

- (iii) Draw a line of best fit on the grid. [1]

- (iv) Ann missed the English test but scored 22 marks in the Mathematics test. Use your line of best fit to estimate a possible English mark for Ann.

Answer(a)(iv) [1]

- (b) Show that the mean English mark for the 10 students is 28.

Answer(b)

[2]

- (c) Two new students do the English test. They both score the **same** mark. The mean English mark for the 12 students is 31. Calculate the English mark for the new students.

Answer(c) [3]

- 2 (a) In a sale, Jen buys a laptop for \$351.55.
This price is 21% less than the price before the sale.

Calculate the price before the sale.

Answer(a) \$ [3]

- (b) Alex invests \$4000 at a rate of 8% per year simple interest for 2 years.
Bob invests \$4000 at a rate of 7.5% per year compound interest for 2 years.

Who receives more interest and by how much?

Answer(b) receives \$ more interest. [6]

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3 Pablo plants x lemon trees and y orange trees.

(a) (i) He plants at least 4 lemon trees.

Write down an inequality in x to show this information.

Answer(a)(i) [1]

(ii) Pablo plants at least 9 orange trees.

Write down an inequality in y to show this information.

Answer(a)(ii) [1]

(iii) The greatest possible number of trees he can plant is 20.

Write down an inequality in x and y to show this information.

Answer(a)(iii) [1]

(b) Lemon trees cost \$5 each and orange trees cost \$10 each.

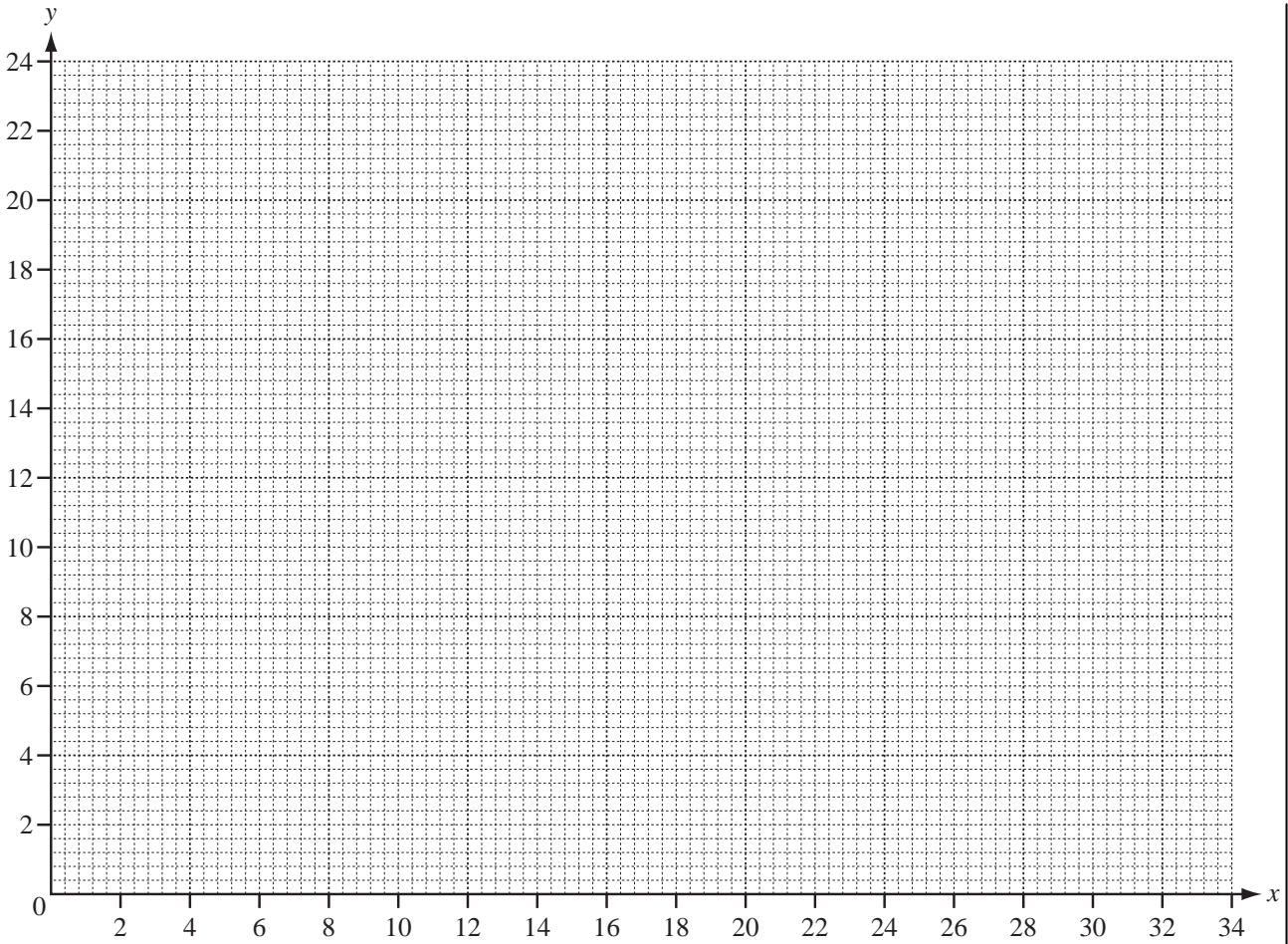
The maximum Pablo can spend is \$170.

Write down an inequality in x and y and show that it simplifies to $x + 2y \leq 34$.

Answer (b)

[1]

(c) (i) On the grid opposite, draw four lines to show the four inequalities and shade the **unwanted** region.

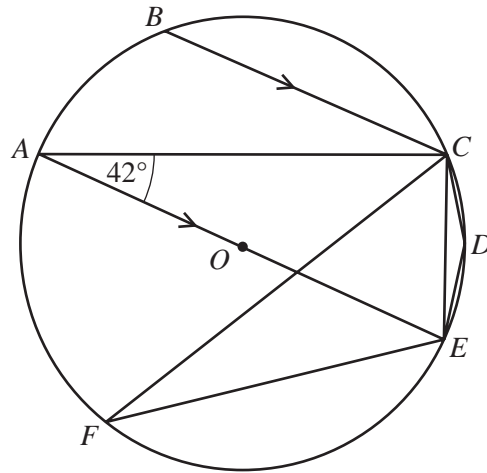


[7]

(ii) Calculate the smallest cost when Pablo buys a total of 20 trees.

Answer(c)(ii) \$ [2]

4 (a)

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A, B, C, D, E and F are points on the circumference of a circle centre O .
 AE is a diameter of the circle.
 BC is parallel to AE and angle $CAE = 42^\circ$.

Giving a reason for each answer, find

(i) angle BCA ,

Answer(a)(i) Angle $BCA = \dots\dots\dots$

Reason [2]

(ii) angle ACE ,

Answer(a)(ii) Angle $ACE = \dots\dots\dots$

Reason [2]

(iii) angle CFE ,

Answer(a)(iii) Angle $CFE = \dots\dots\dots$

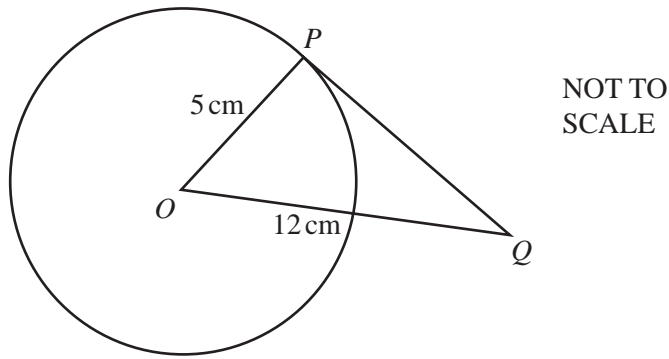
Reason [2]

(iv) angle CDE .

Answer(a)(iv) Angle $CDE = \dots\dots\dots$

Reason [2]

(b)

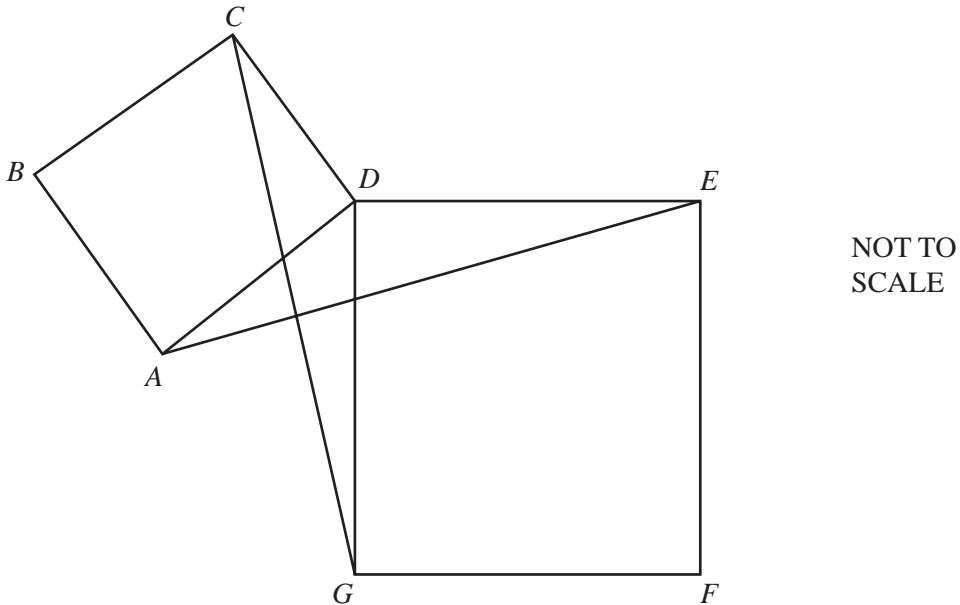


In the diagram, O is the centre of the circle and PQ is a tangent to the circle at P .
 $OP = 5$ cm and $OQ = 12$ cm.

Calculate PQ .

Answer(b) $PQ = \dots\dots\dots$ cm [3]

(c)



In the diagram, $ABCD$ and $DEFG$ are squares.

(i) In the triangles CDG and ADE , explain with a reason which sides and/or angles are equal.

Answer (c)(i)

[3]

(ii) Complete the following statement.

Triangle CDG is to triangle ADE .

[1]

- 5 (a) In Portugal, Miguel buys a book about planets.
The book costs €34.95.
In England the same book costs £27.50.
The exchange rate is £1 = €1.17.

Calculate the difference in pounds (£) between the cost of the book in Portugal and England.

Answer(a) £ [2]

- (b) In the book, the distance between two planets is given as 4.07×10^{12} kilometres.
The speed of light is 1.1×10^9 kilometres per hour.

Calculate the time taken for light to travel from one of these planets to the other.
Give your answer in days and hours.

Answer(b) days hours [3]

- (c) In one of the pictures in the book, a rectangle is drawn.
The rectangle has length 9.3 cm and width 5.6 cm, both correct to one decimal place.

- (i) What is the lower bound for the length?

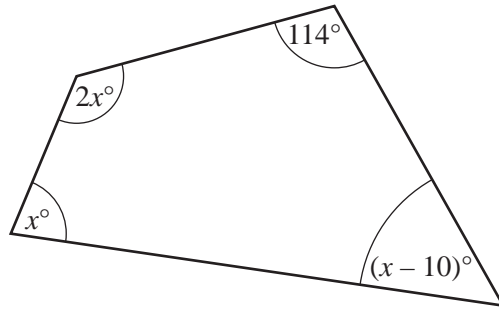
Answer(c)(i) cm [1]

- (ii) Work out the lower and upper bounds for the area of the rectangle.

Answer(c)(ii) Lower bound = cm^2

Upper bound = cm^2 [2]

6 (a)



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Find the value of x .

Answer(a) $x = \dots\dots\dots$ [3]

(b) (i) Write the four missing terms in the table for sequences A, B, C and D.

Term	1	2	3	4	5		n
Sequence A	-4		2	5	8		$3n - 7$
Sequence B	1	4	9	16	25		
Sequence C	5	10	15	20	25		
Sequence D	6	14	24	36	50		

[4]

(ii) Which term in sequence D is equal to 500?

Answer(b)(ii) $\dots\dots\dots$ [2]

(c) Simplify $\frac{x^2 - 16}{2x^2 + 7x - 4}$.

Answer(c) $\dots\dots\dots$ [4]

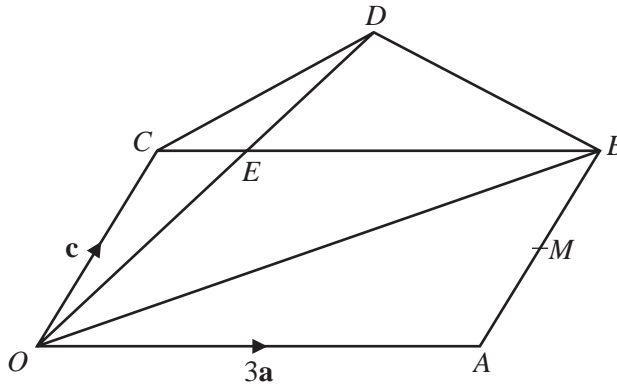
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7 (a) P is the point $(2, 5)$ and $\vec{PQ} = \begin{pmatrix} 3 \\ -2 \end{pmatrix}$.

Write down the co-ordinates of Q .

Answer(a) (..... ,) [1]

(b)



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O is the origin and $OACB$ is a parallelogram.
 M is the midpoint of AB .

$\vec{OC} = \mathbf{c}$, $\vec{OA} = 3\mathbf{a}$ and $CE = \frac{1}{3}CB$.

OED is a straight line with $OE : ED = 2 : 1$.

Find in terms of \mathbf{a} and \mathbf{c} , in their simplest forms

(i) \vec{OB} ,

Answer(b)(i) $\vec{OB} = \dots\dots\dots$ [1]

(ii) the position vector of M ,

Answer(b)(ii) $\dots\dots\dots$ [2]

(iii) \vec{OE} ,

Answer(b)(iii) $\vec{OE} = \dots\dots\dots$ [1]

(iv) \vec{CD} .

Answer(b)(iv) $\vec{CD} = \dots\dots\dots$ [2]

(c) Write down two facts about the lines CD and OB .

Answer (c) $\dots\dots\dots$
 $\dots\dots\dots$ [2]

8 In all parts of this question give your answer as a fraction in its lowest terms.

(a) (i) The probability that it will rain today is $\frac{1}{3}$.

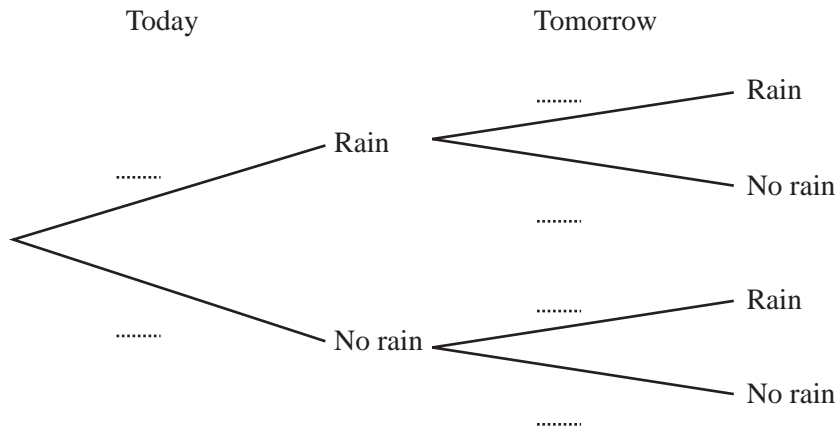
What is the probability that it will not rain today?

Answer(a)(i) [1]

(ii) If it rains today, the probability that it will rain tomorrow is $\frac{2}{5}$.

If it does not rain today, the probability that it will rain tomorrow is $\frac{1}{6}$.

Complete the tree diagram.



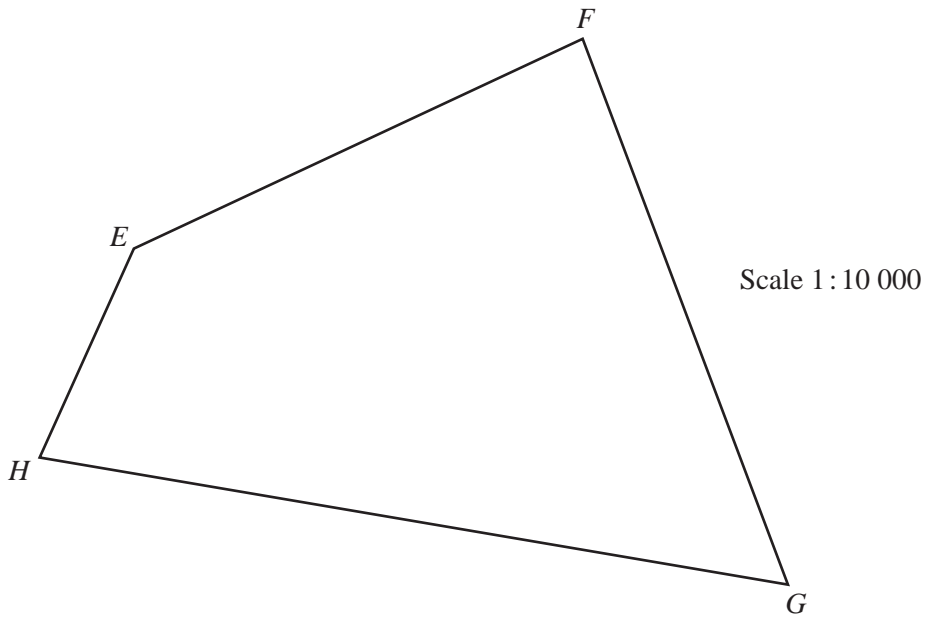
[2]

(b) Find the probability that it will rain on at least one of these two days.

Answer(b) [3]

(c) Find the probability that it will rain on only one of these two days.

Answer(c) [3]



The diagram is a scale drawing of a park $EFGH$. The scale is 1:10 000.

A statue is to be placed in the park so that it is

- nearer to G than to H
- nearer to HG than to FG
- more than 550 metres from F .

Construct accurately the boundaries of the region R in which the statue can be placed.

Leave in all your construction arcs and shade the region R .

[7]

10 (a) Simplify

(i) $(2x^2y^3)^3$,

Answer(a)(i) [2]

(ii) $\left(\frac{27}{x^6}\right)^{-\frac{1}{3}}$.

Answer(a)(ii) [3]

(b) Multiply out and simplify.

$$(3x - 2y)(2x + 5y)$$

Answer(b) [3]

(c) Make h the subject of

(i) $V = \pi r^3 + 2\pi r^2 h$,

Answer(c)(i) $h =$ [2]

(ii) $V = \sqrt{3h}$.

Answer(c)(ii) $h =$ [2]

(d) Write as a single fraction in its simplest form.

$$\frac{x}{2} + \frac{5x}{3} - \frac{7x}{4}$$

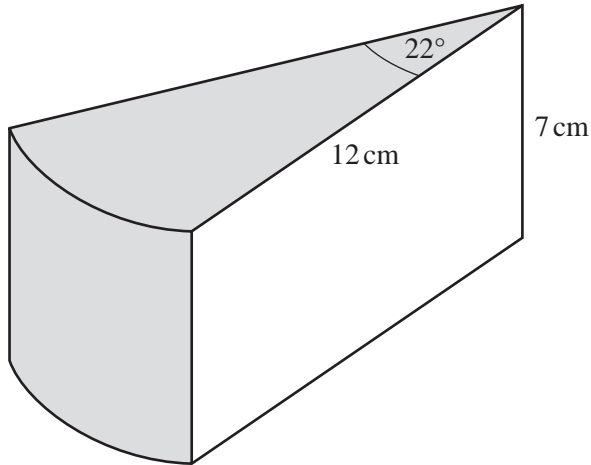
Answer(d) [2]

11 (a) Calculate the area of a circle with radius 12 cm.

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Answer(a) cm² [2]

(b)



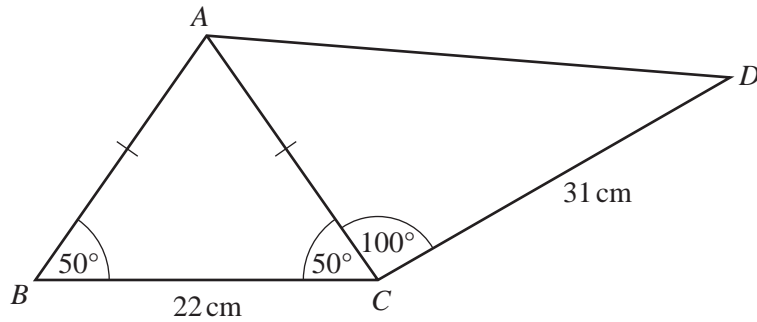
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A circular cake has radius 12 cm and height 7 cm.
The uniform cross-section of a slice of the cake is a sector with angle 22°.
The top and the curved surface of the slice, shaded in the diagram, are covered with chocolate.

Calculate the area of the slice which is covered with chocolate.

Answer(b) cm² [5]

(c)

NOT TO
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The frame of a child's bicycle is made from metal rods.
 ABC is an isosceles triangle with base 22 cm and base angles 50° .
 Angle $ACD = 100^\circ$ and $CD = 31$ cm.

Calculate the length AD .

Answer(c) $AD =$ cm [6]

Question 12 is printed on the next page.

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12 (a) The cost of 1 kg of tomatoes is \$ x and the cost of 1 kg of onions is \$ y .

Ian pays a total of \$10.70 for 10 kg of tomatoes and 4 kg of onions.

Jao pays a total of \$10.10 for 8 kg of tomatoes and 6 kg of onions.

Write down simultaneous equations and solve them to find x and y .

Answer(a) $x =$

$y =$ [6]

(b) Solve $2x^2 - 5x - 8 = 0$.

Give your answers correct to 2 decimal places.
Show all your working.

Answer(b) $x =$ or $x =$ [4]

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