SAE/013/0509/19   07/88

Centre Number

Candidate Number

Surname
Issued.

UNIVERSITY OF LONDON

General Certificate of Education Examination

JANUARY 1988   ORDINARY LEVEL

Mathematics (Syllabus B) 1

One and a quarter hours

INSTRUCTIONS TO CANDIDATES

USE AN HB PENCIL THROUGHOUT THE TEST

DO NOT OPEN THIS BOOKLET UNTIL YOU ARE TOLD TO DO SO

Before the test begins:

1. Insert the information required in the spaces above.

2. Check that your answer sheet, which will be handed to you separately, is headed 'Ordinary level – 361 Mathematics Syllabus B Paper 1'. Take care that you do not crease or fold the answer sheet or make any marks on it other than those asked for in these instructions.

3. Insert the information required in the spaces provided on the answer sheet. When you have written your Centre Number and Candidate Number in the boxes provided draw neat *horizontal* lines with your HB pencil to join the dots under the appropriate numbers in the grids below the boxes. (You can see how to do this in the right-hand column headed 'Test Number'.) Make sure you have marked the right numbers.

How to answer the test:

4. For each question there are five suggested answers, **A, B, C, D** and **E**. When you have selected your answer to the question, find the row on the answer sheet with the number of that question and draw a *horizontal* line to join the dots under the letter for the answer you have chosen.

    For example the answer **C** would be marked as shown.

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┌─────────────────────────────┐
│     A   B   C   D   E        │
│    ⊢ ⊣⊢ ⊣⊢──⊣⊢ ⊣⊢ ⊣         │
└─────────────────────────────┘
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5. Mark only one answer for each question. If you change your mind about an answer, rub out the first mark carefully, then mark your new answer.

6. There are 50 questions in this test and you are advised to answer all the questions. You will score one mark for each correct answer; no marks will be deducted for incorrect answers or omissions.

7. Do all rough work in this booklet.

You must not take this booklet out of the examination room. All question booklets and answer sheets will be collected at the end of the test.

Directions. Each of these questions is followed by five suggested answers. Select the correct answer in each case and mark the answer sheet appropriately.
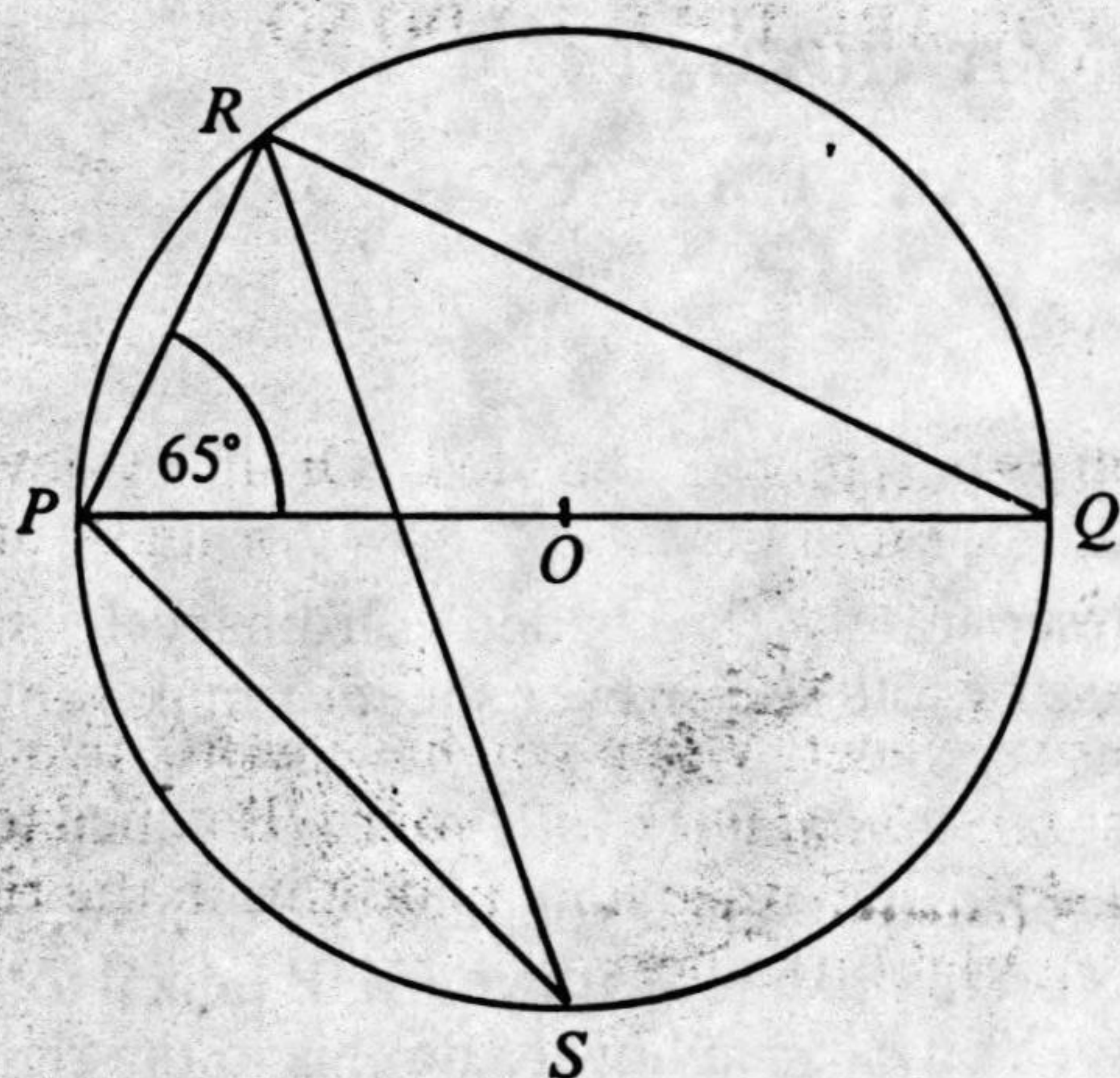
1. Given that the value of y in the solution of the simultaneous equations

$$2x - 5y = 2,$$
$$3x + ky = 24,$$

is 2, then $k =$

A -6

B -3

C -2

D 3

E 6

2.

PQ is a diameter of the circle with centre O and $\angle QPR = 65°$

$\angle PSR =$

A $25°$

B $32\frac{1}{2}°$

C $35°$

D $50°$

E $65°$

3. A dealer buys a toy for £24·60 and sells it at a profit of 20%. His selling price is

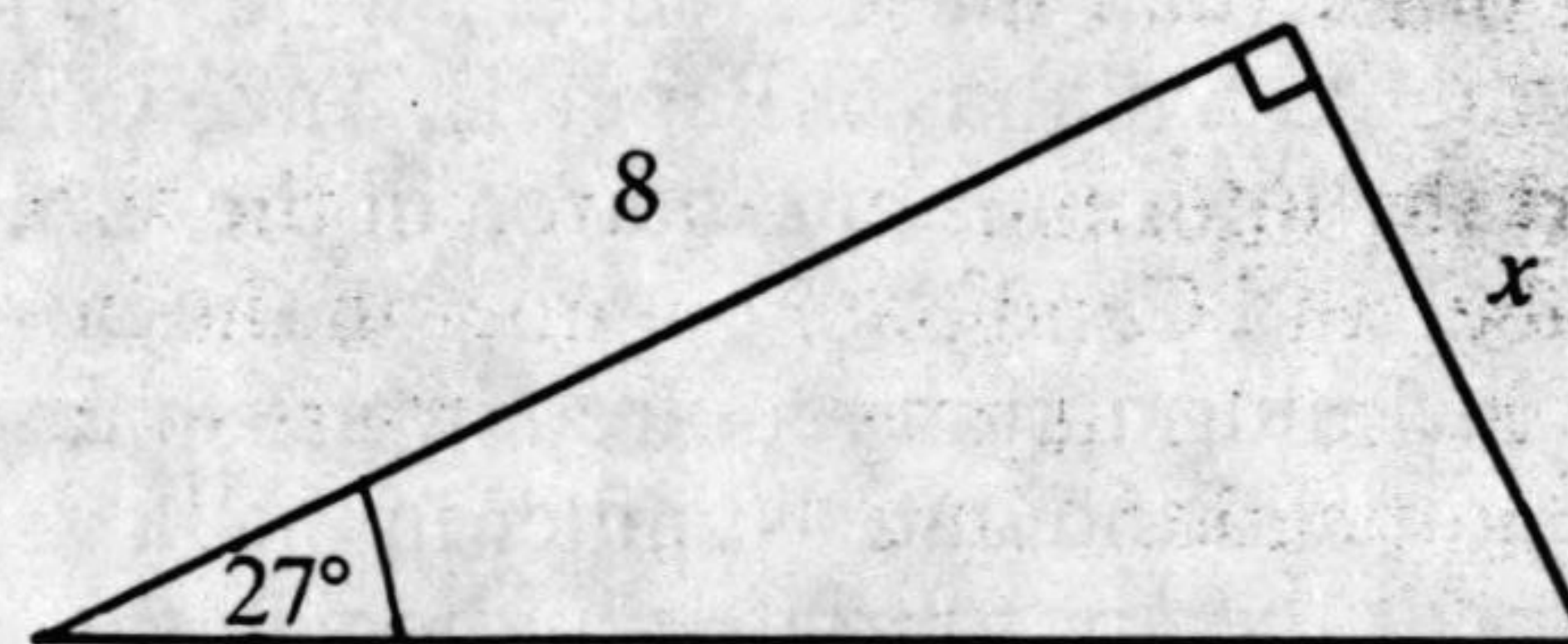A   £24·80

B   £25·52

C   £29·52

D   £30·75

E   £36·90

4.

$\cos \theta° =$

A $\dfrac{3}{5}$

B $\dfrac{3}{4}$

C $\dfrac{4}{5}$

D $\dfrac{5}{4}$

E $\dfrac{5}{3}$

5.

$\dfrac{x}{8} =$

A $\sin 27°$

B $\tan 27°$

C $\cos 27°$

D $\sin 63°$

E $\tan 63°$

6. Given that $X = \begin{pmatrix} -3 & 5 \\ -2 & 3 \end{pmatrix}$, then $X^{-1} =$
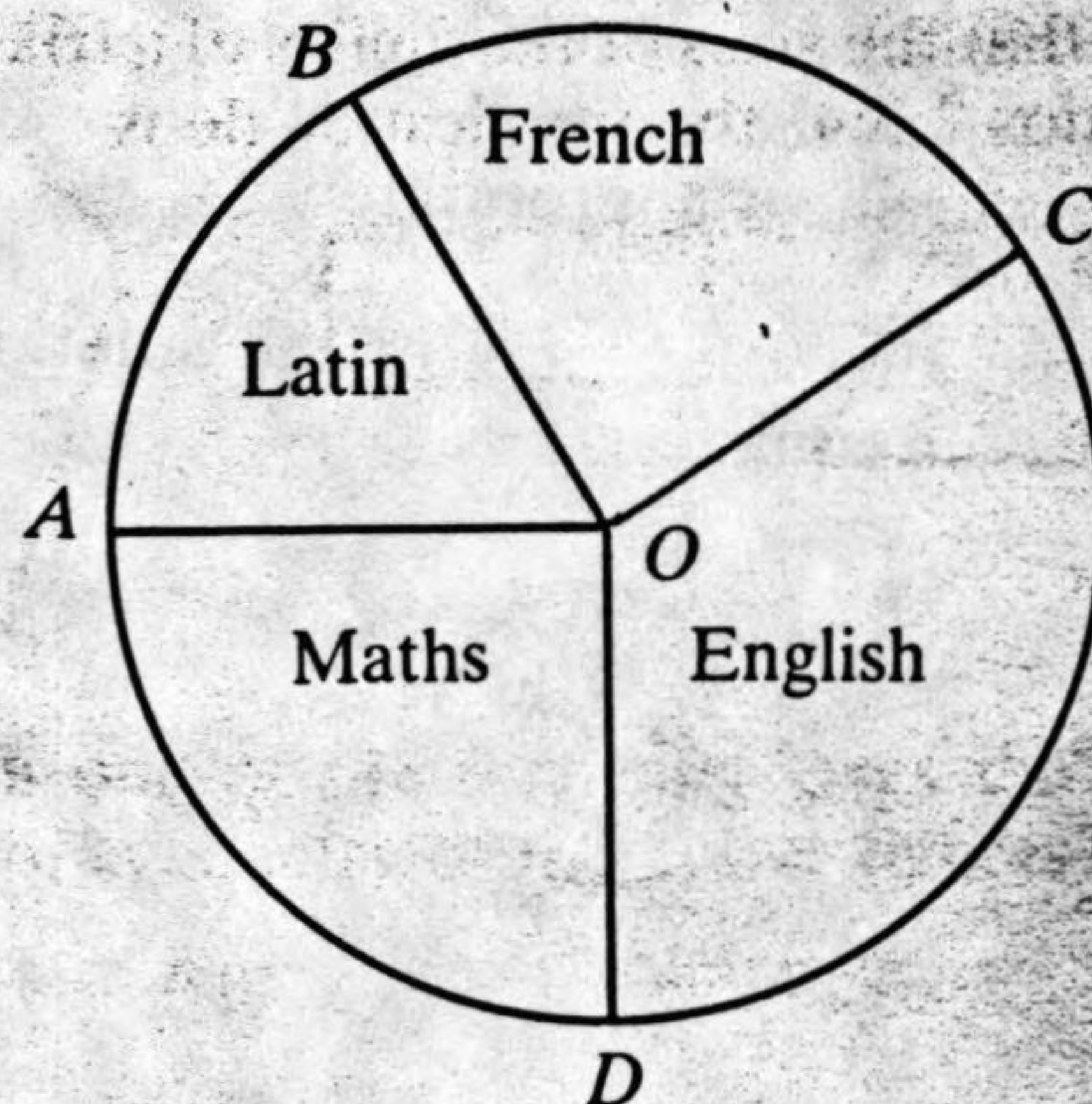
A $\begin{pmatrix} 3 & -5 \\ 2 & -3 \end{pmatrix}$

B $\begin{pmatrix} -3 & 5 \\ -2 & 3 \end{pmatrix}$

C $\begin{pmatrix} 3 & 2 \\ -5 & -3 \end{pmatrix}$

D $\begin{pmatrix} -5 & -3 \\ 3 & 2 \end{pmatrix}$

E $\begin{pmatrix} 3 & 5 \\ -2 & -3 \end{pmatrix}$

7.

The length of PR, to the nearest centimetre, is

A   3 cm

B   6 cm

C   7 cm

D   9 cm

E   10 cm

8. A coin and a die are to be tossed together. The probability of the result being a head on the coin and a five on the die is

A $\dfrac{1}{12}$

B $\dfrac{1}{6}$

C $\dfrac{1}{5}$

D $\dfrac{1}{4}$

E $\dfrac{2}{3}$

9.

The pie chart shows how a boy spent 4 hours studying four subjects. The angle $AOD = 90°$ and the angle $BOA = 60°$. Given that he spent 80 minutes studying English, how many minutes did he spend studying French?
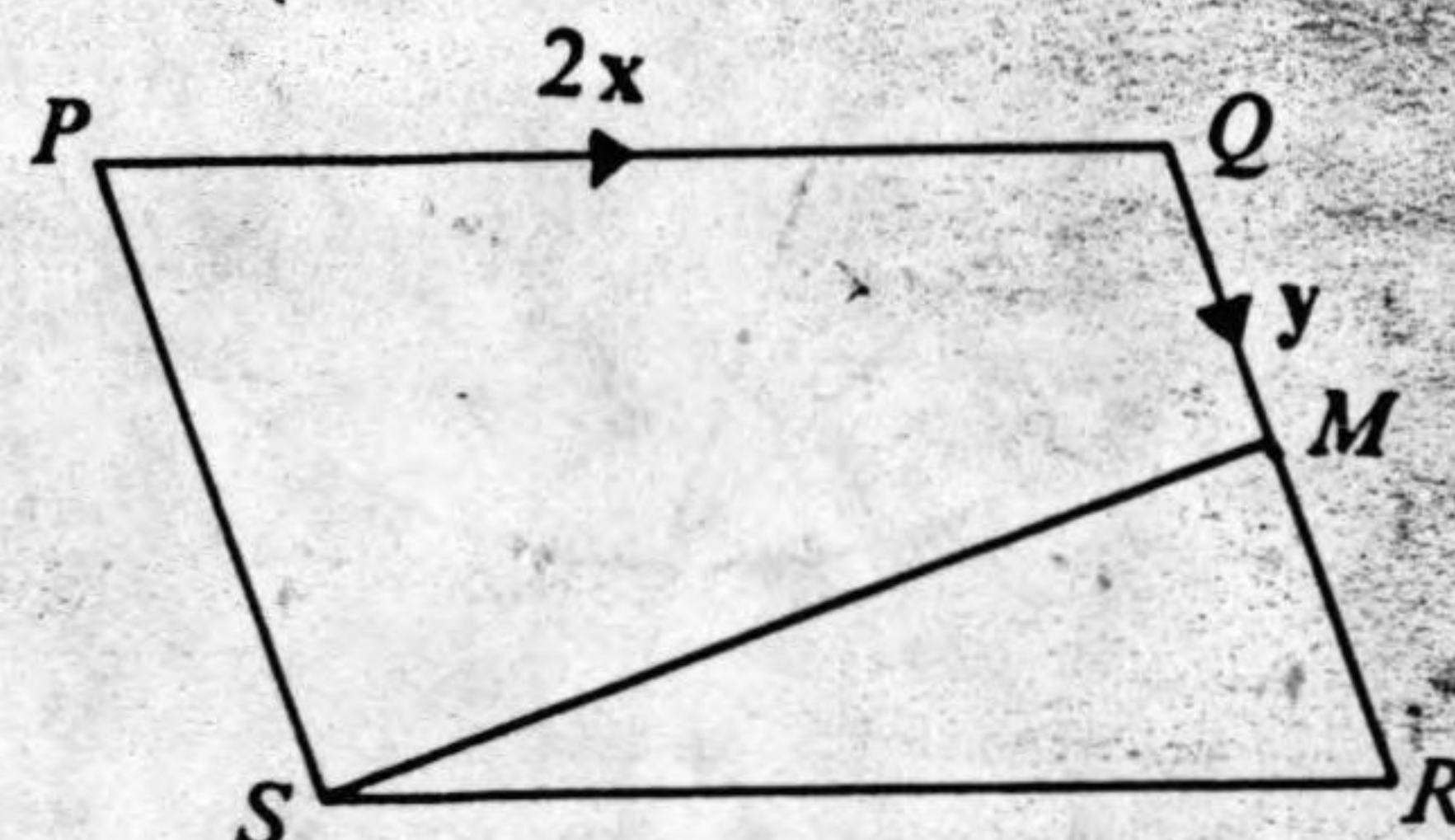
A   10

B   60

C   90

D   130

E   180

10.

M is the mid-point of the side QR of the parallelogram $PQRS$. Given that $\overrightarrow{PQ} = 2x$ and $\overrightarrow{QM} = y$, then $\overrightarrow{SM} =$

A $x + y$

B $x - y$

C $2x + y$

D $2x - y$

E $2x + 2y$

Directions. Each of these questions is followed by five suggested answers. Select the correct answer in each case and mark the answer sheet appropriately.
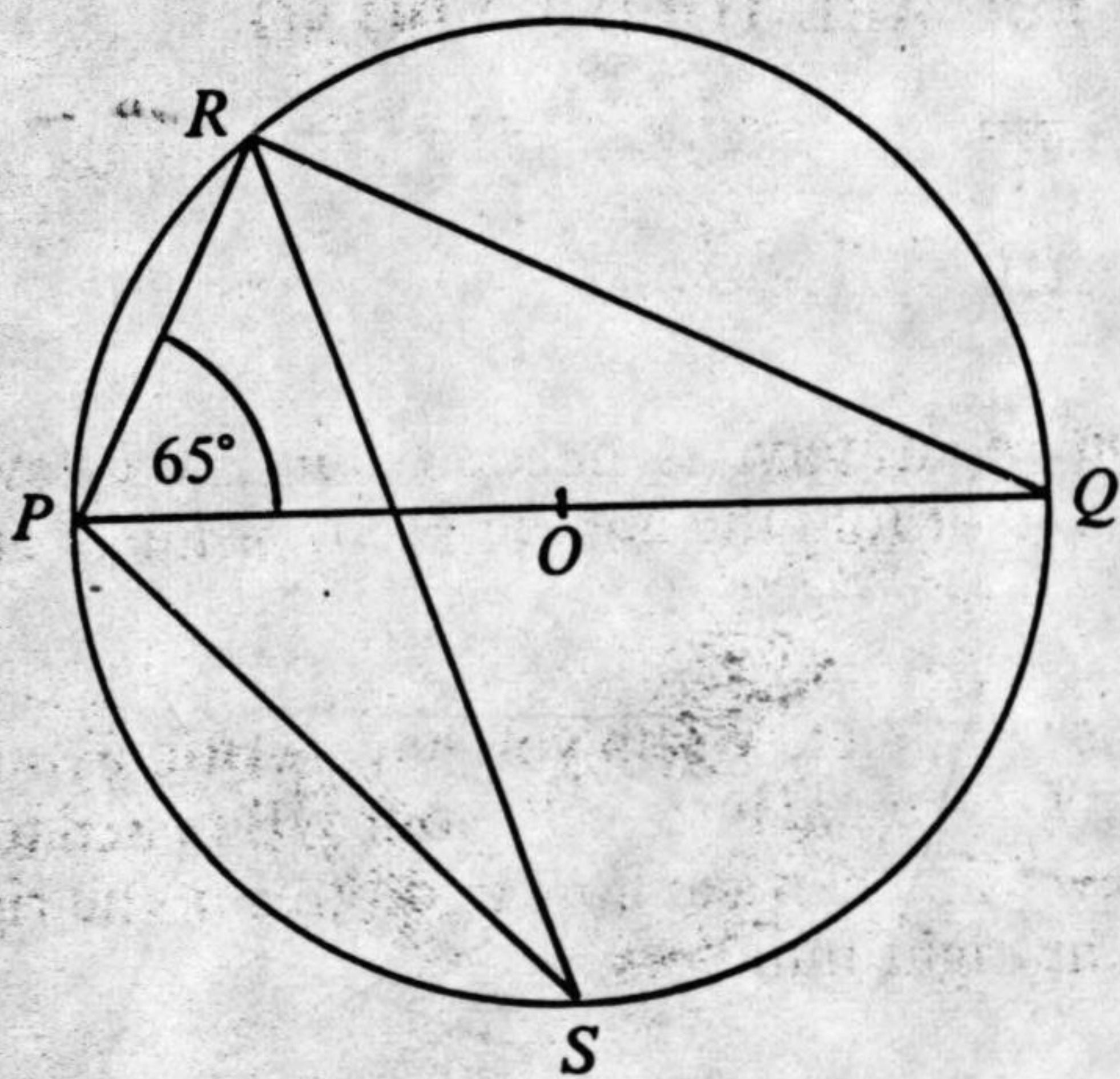
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3. A dealer buys a toy for £24·60 and sells it at a profit of 20%. His selling price is

A   £24·80

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C   £29·52

D   £30·75

E   £36·90
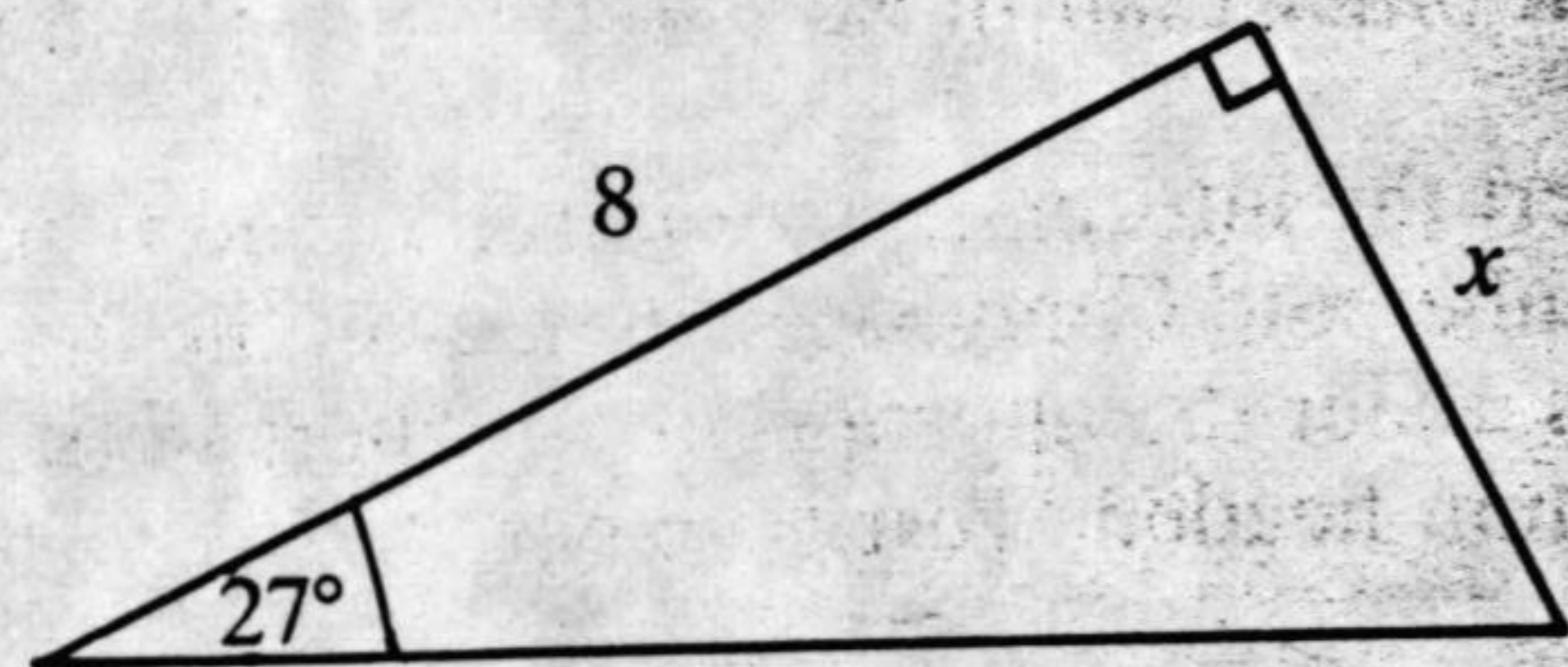
4. ✓

$\cos \theta° =$

A $\dfrac{3}{5}$

B $\dfrac{3}{4}$

C $\dfrac{4}{5}$

D $\dfrac{5}{4}$

E $\dfrac{5}{3}$

5. ✓

$\dfrac{x}{8} =$

A $\sin 27°$

B $\tan 27°$

C $\cos 27°$

D $\sin 63°$

E $\tan 63°$

2

11. Given that the sizes of the angles of a triangle are in the ratios 2:3:4, the smallest angle is

A 10°

B 20°

C 40°

D 45°

E 60°

12. Given that $\frac{2}{x} + 2 = \frac{3}{x}$, then $x =$
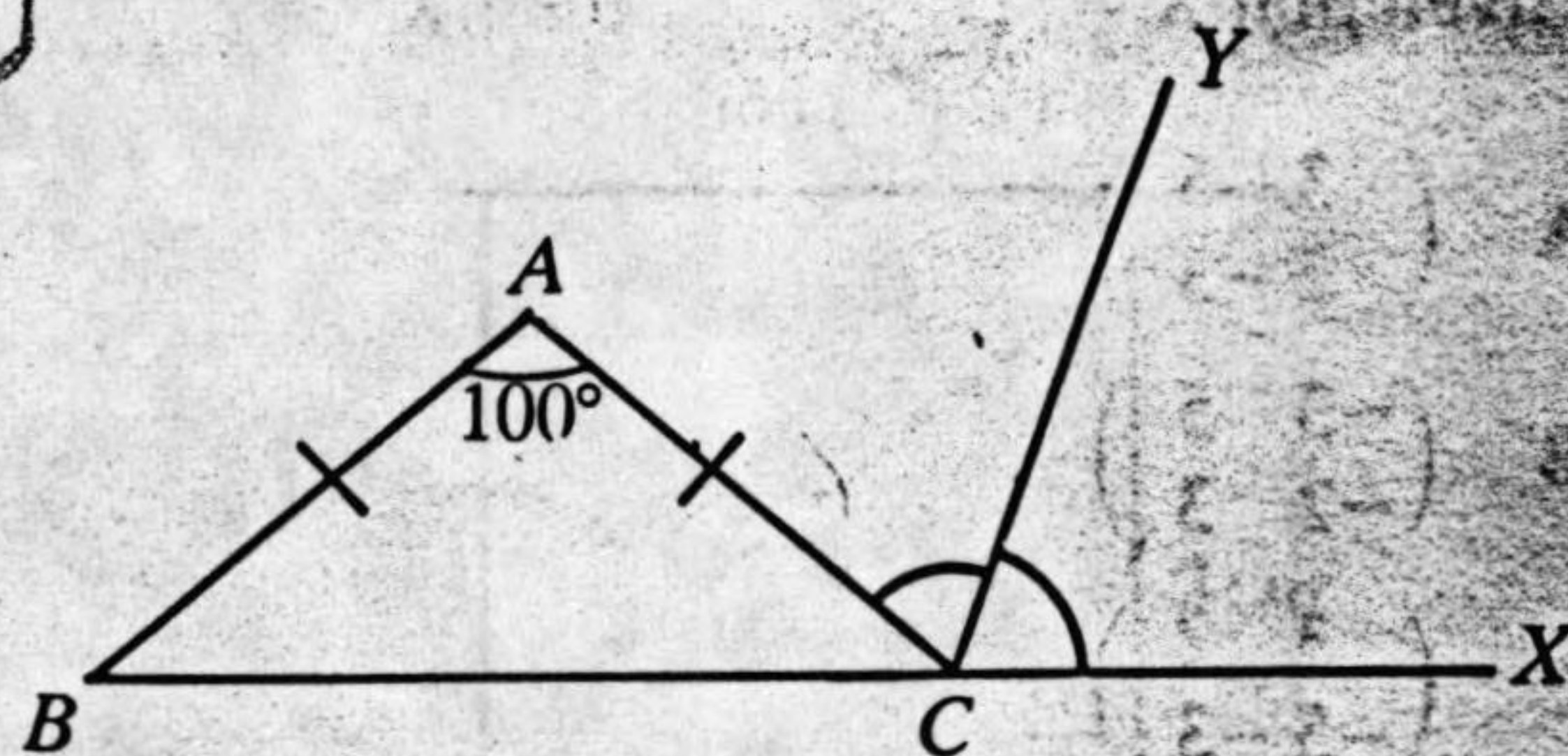
A −3

B ½

C 2

D 2½

E +3

13. Given that $(2 \quad y) \begin{pmatrix} -1 & 2 \\ 0 & 1 \end{pmatrix} = (-2 \quad 0)$, then $y =$

A 4

B 1

C 0

D −1

E −4

14. $\frac{a}{b} - \frac{b}{a} =$

A $a^2 - b^2$

B $\dfrac{a^2 - b^2}{b - a}$

C $\dfrac{a^2 - b^2}{ab}$

D $\dfrac{a - b}{ab}$

E $\dfrac{a - b}{b - a}$

15.

$AB = AC$, and CY bisects $\angle ACX$.
$\angle YCX =$

A 75°

B 70°

C 60°

D 50°

E 40°

16.

Number of people living in house	Frequency
2	10
3	60
4	20
5	10

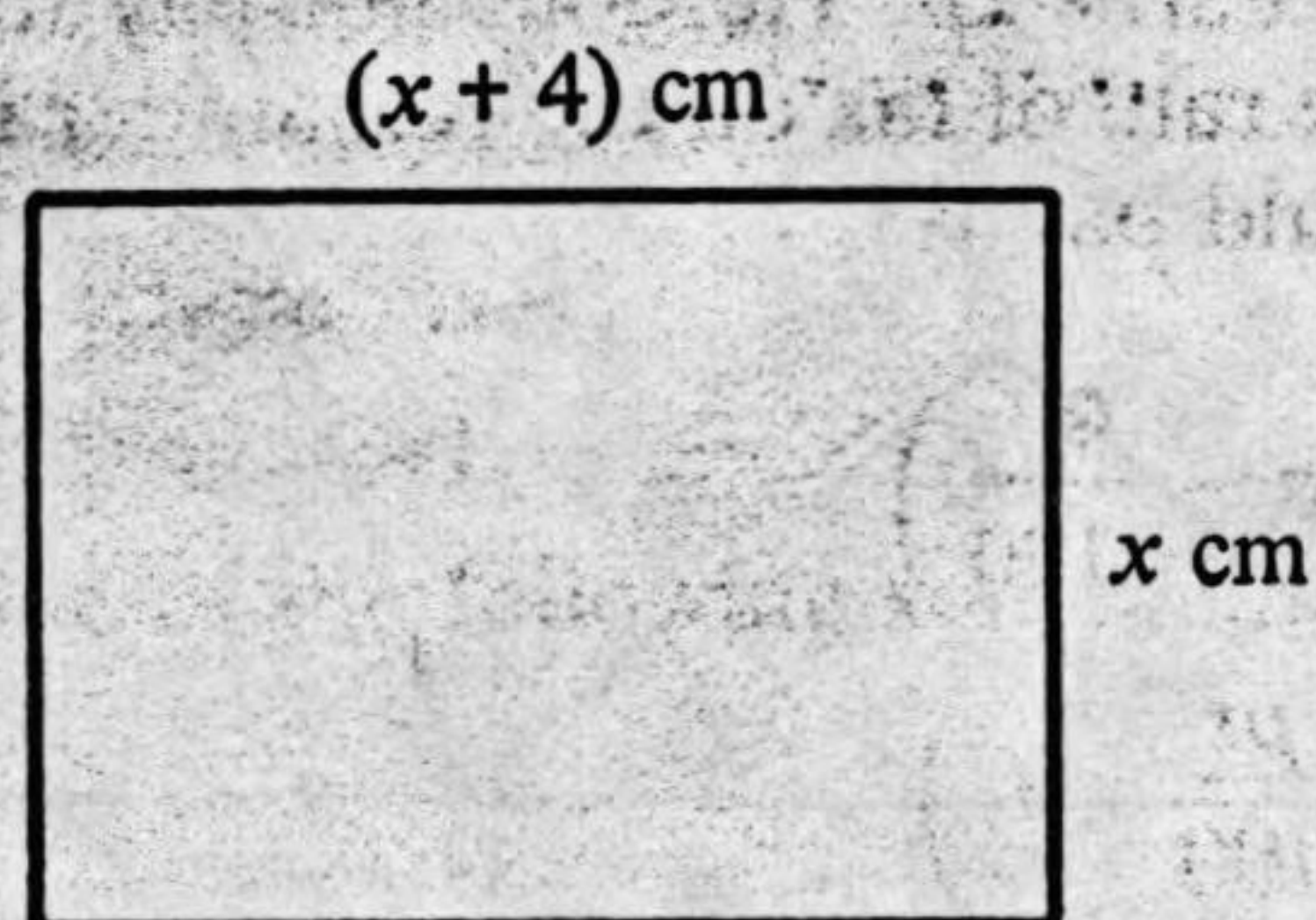The table shows the number of people living in each of 100 houses. The mean number of people per house is

A 3

B 3·3

C 3·5

D 7·1

E none of the above

17. a, b, c, d, e are positive integers such that $a > c > e$ and $b > d$. Which one of the following statements is *not* necessarily true?

A $a + b > b + c$

B $ab > cd$

C $a + b > d + e$

D $a + e > b + c + d$

E $abc > cde$

4

18.

(x + 4) cm

x cm

Given that the rectangle above has a perimeter of 60 cm, which one of the following equations is correct?

A $2x + 4 = 60$

B $4x + 8 = 60$
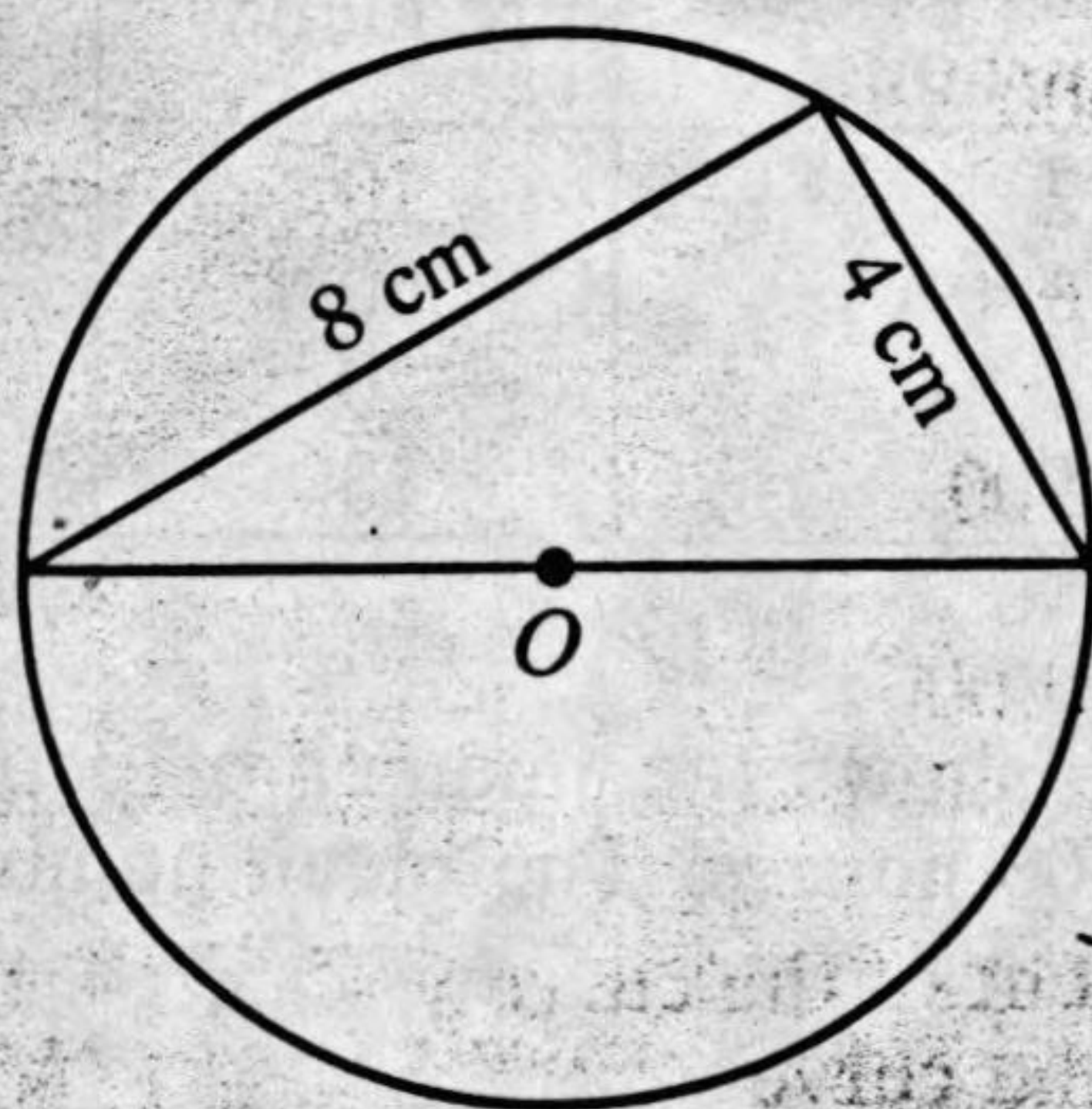
C $4x + 16 = 60$

D $x^2 + 4 = 60$

E $x^2 + 4x = 60$

19.

8 cm   4 cm

O

O is the centre of the circle. The length, in cm, of the diameter is

A just under 7

B between 7 and 8

C just under 9

D between 9 and 10

E over 10

20. The transformation represented by the matrix $\begin{pmatrix} 1 & 0 \\ 0 & -1 \end{pmatrix}$ is

A a rotation of 90° about the origin

B a rotation of −90° about the origin

C a reflection in the line $y = -x$

D a reflection in the y-axis

E a reflection in the x-axis

21. KITE   RECTANGLE   RHOMBUS

Which one of the following gives the number of lines of symmetry of the above figures?

	Kite	Rectangle	Rhombus
A	1	4	2
B	2	2	2
C	1	2	0
D	2	4	0
E	1	2	2

22. Given that
$A = \{x : x$ is a prime number and $x < 50\}$ and
$B = \{x : x$ is a prime number and $40 < x < 50\}$,
then $n(A \cap B) =$

A 1

B 2

C 3

D 4

E 5

23. It is given that 8 km = 5 miles, £1 = 12 francs and motoring costs 10p for each mile travelled. What is the cost, in francs, of travelling 1 km?
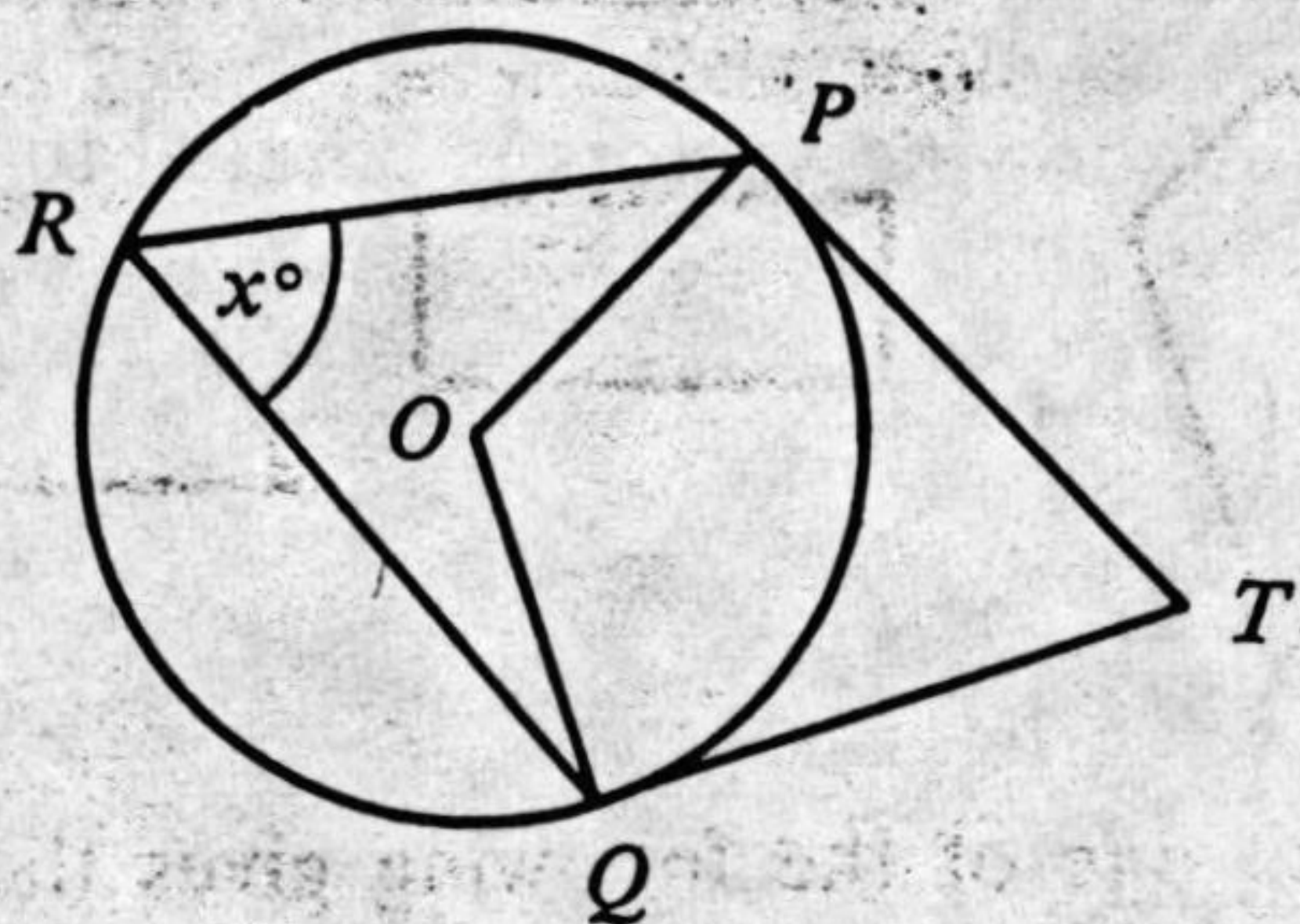
A 0·75

B 1·20

C 1·33

D 1·60

E 1·92

24.

TP and *TQ* are tangents to the circle centre *O*.
$\angle PTQ =$

A $(90 - \tfrac{1}{2}x)°$

B $(\tfrac{1}{2}x)°$

C $(180 - 2x)°$

D $x°$

E $(180 - x)°$

25. Every time a coin is tossed, a head scores 2 points and a tail scores 3 points. The mean number of points scored per toss if 4 heads are recorded in 10 tosses is

A 2·4

B 2·5

C 2·6

D 5

E 8

26. I cut out from a rectangular piece of paper 2 m by 1 m the largest circle I can. The area, in m², of paper which is left over is

A 1·5

B $\dfrac{\pi}{4}$

C $2 - \dfrac{\pi}{4}$

D $\pi - 2$

E $2\pi - 2$

27. A man earns £*p*. He does not pay tax on the first £*q*. The rate of tax on the remainder is *r*%. The tax he should pay is

A $£\left(p - \dfrac{qr}{100}\right)$

B $£\left(\dfrac{pr}{100} - q\right)$

C $£\left(\dfrac{pr - q}{100}\right)$

D $£\left(\dfrac{p - qr}{100}\right)$

E $£\left(\dfrac{(p - q)r}{100}\right)$

28. The scale of a map is given in the form 4 cm represents 5 km.
The ratio of a distance on the map to the corresponding distance on the ground is

A 1:12 500

B 1:80 000

C 1:125 000

D 1:800 000

E 1:1 250 000

29. The gradient of the curve $y = 4x^3 - 4x + 1$, at the point on the curve where $x = -1$, is

A 9

B 8

C 1

D −15

E −16

30. P = {parallelograms},
Q = {quadrilaterals},
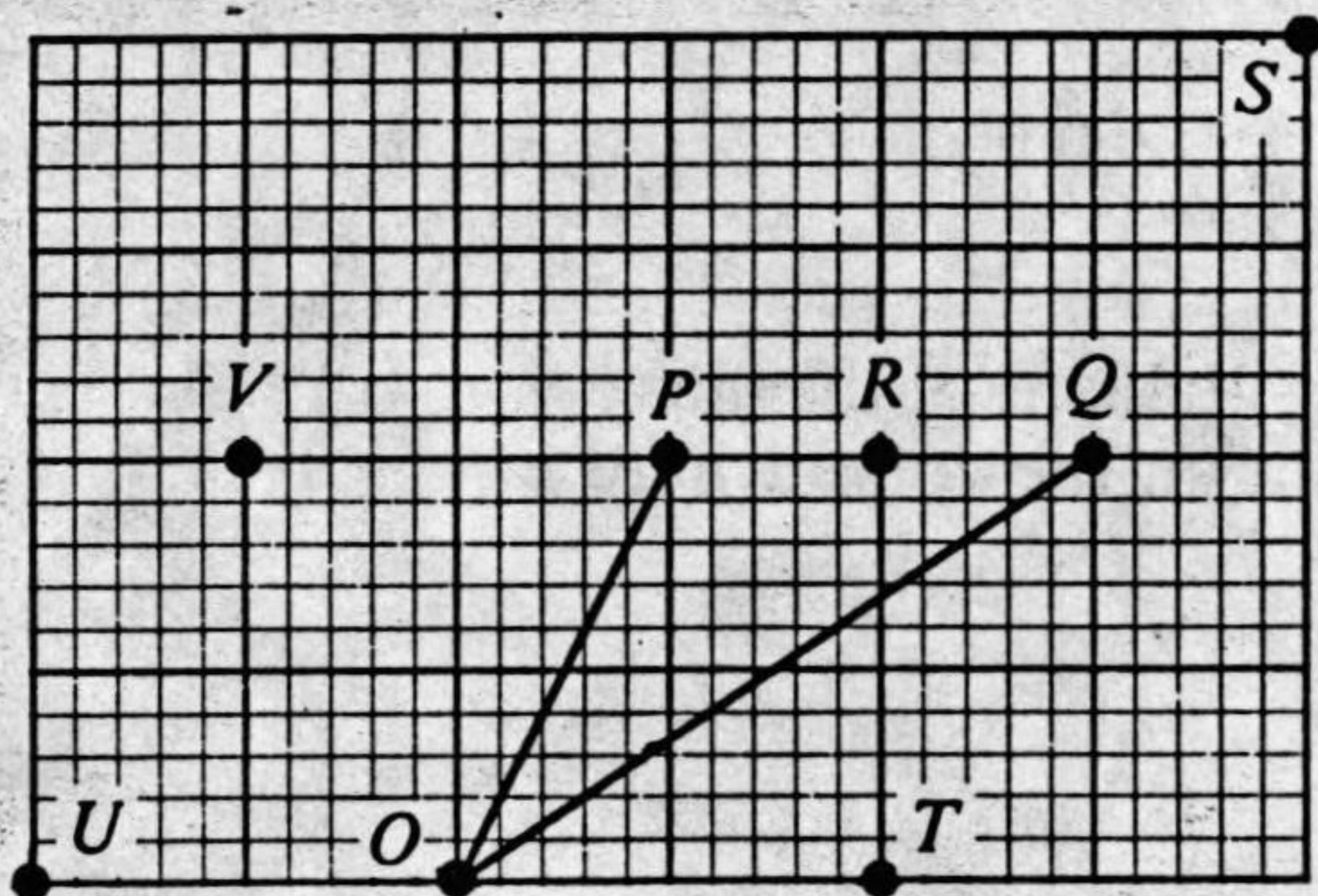R = {rhombuses},
S = {squares}.

Which one of the following statements is *false*?

A $R \subset S$

B $S \subset Q$

C $P \subset Q$

D $R \subset P$

E $R \subset Q$

31. Given that f : $x \mapsto$ the positive integer nearest to $\sqrt{x}$, then ff(50)=

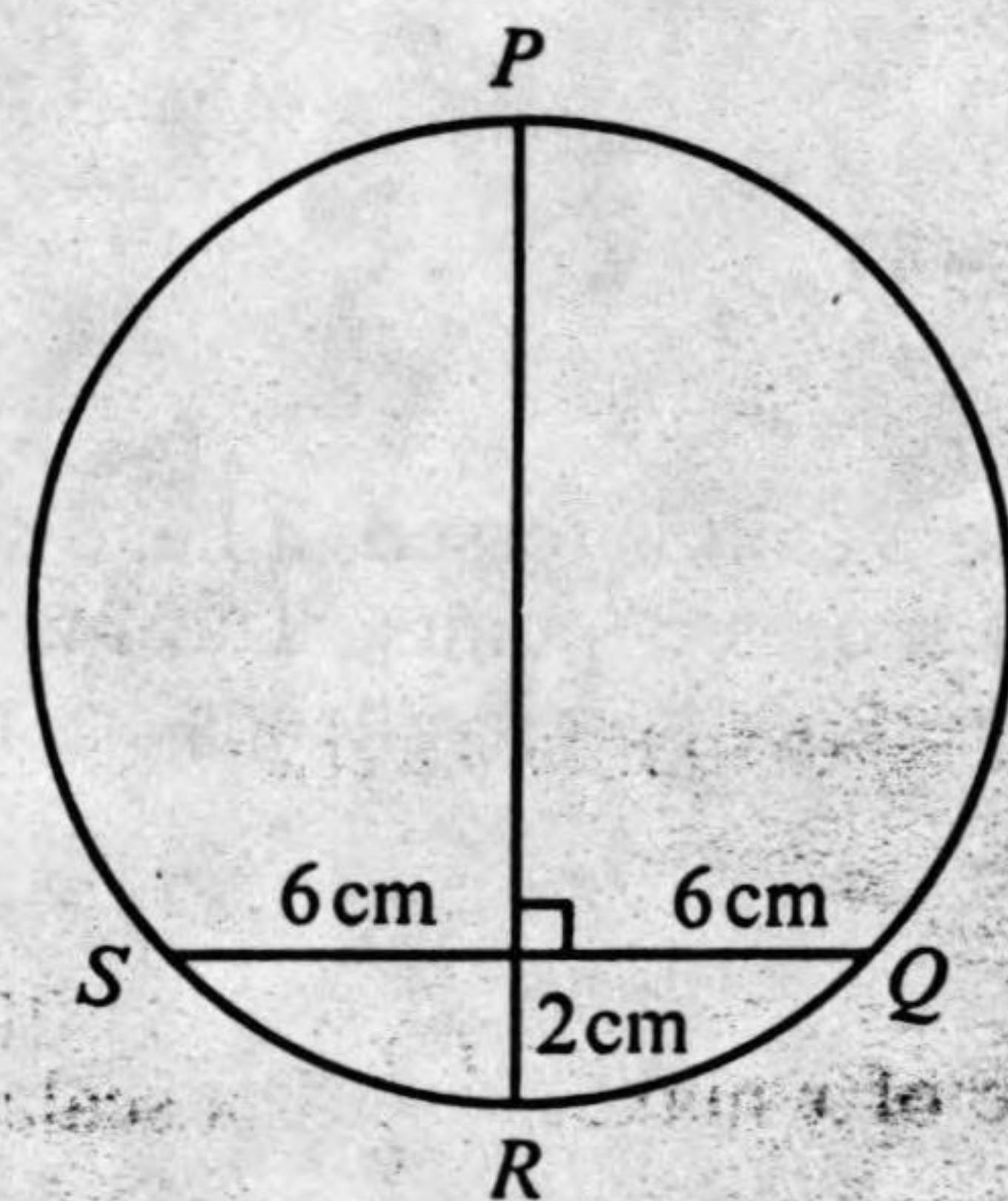A 2

B 3

C 7

D 14

E 49

32.

A vector equal to $\overrightarrow{OQ} - \overrightarrow{OP}$ is

A $\overrightarrow{OR}$

B $\overrightarrow{OS}$

C $\overrightarrow{OT}$

D $\overrightarrow{OU}$

E $\overrightarrow{OV}$

33. Given that $\mathbf{a} = \begin{pmatrix} -2 \\ 2 \end{pmatrix}$ and $\mathbf{b} = \begin{pmatrix} 1 \\ -2 \end{pmatrix}$, which one of the following vectors is parallel to $\mathbf{a} - \mathbf{b}$?

A $\begin{pmatrix} -6 \\ -8 \end{pmatrix}$

B $\begin{pmatrix} -6 \\ 8 \end{pmatrix}$

C $\begin{pmatrix} 6 \\ 8 \end{pmatrix}$

D $\begin{pmatrix} 2 \\ 0 \end{pmatrix}$

E $\begin{pmatrix} -2 \\ 0 \end{pmatrix}$

34.

The area, in cm^2, of $\triangle PQS$ is

A 12

B 54

C 60

D 108

E 216

35. Given that $x * y = \dfrac{x - y}{x + y}$, what is the value of $(2 * 3) - (3 * 2)$?

A $-5\frac{1}{5}$

B $-\frac{2}{5}$

C 0

D $\frac{2}{5}$

E 12

36. The values of x where the graphs of $y = 2x - 3$ and $y = \dfrac{4}{3x - 1}$ intersect are the roots of the equation

A $6x^2 - 7x - 1 = 0$

B $6x^2 - 7x + 3 = 0$

C $6x^2 - 11x + 3 = 0$

D $6x^2 - 11x - 1 = 0$

E $6x^2 - 11x + 7 = 0$

37. The inverse of the matrix $\begin{pmatrix} 1 & 2 \\ 3 & x \end{pmatrix}$ *cannot* be found when $x =$

A -6

B -4

C 0

D 4

E 6

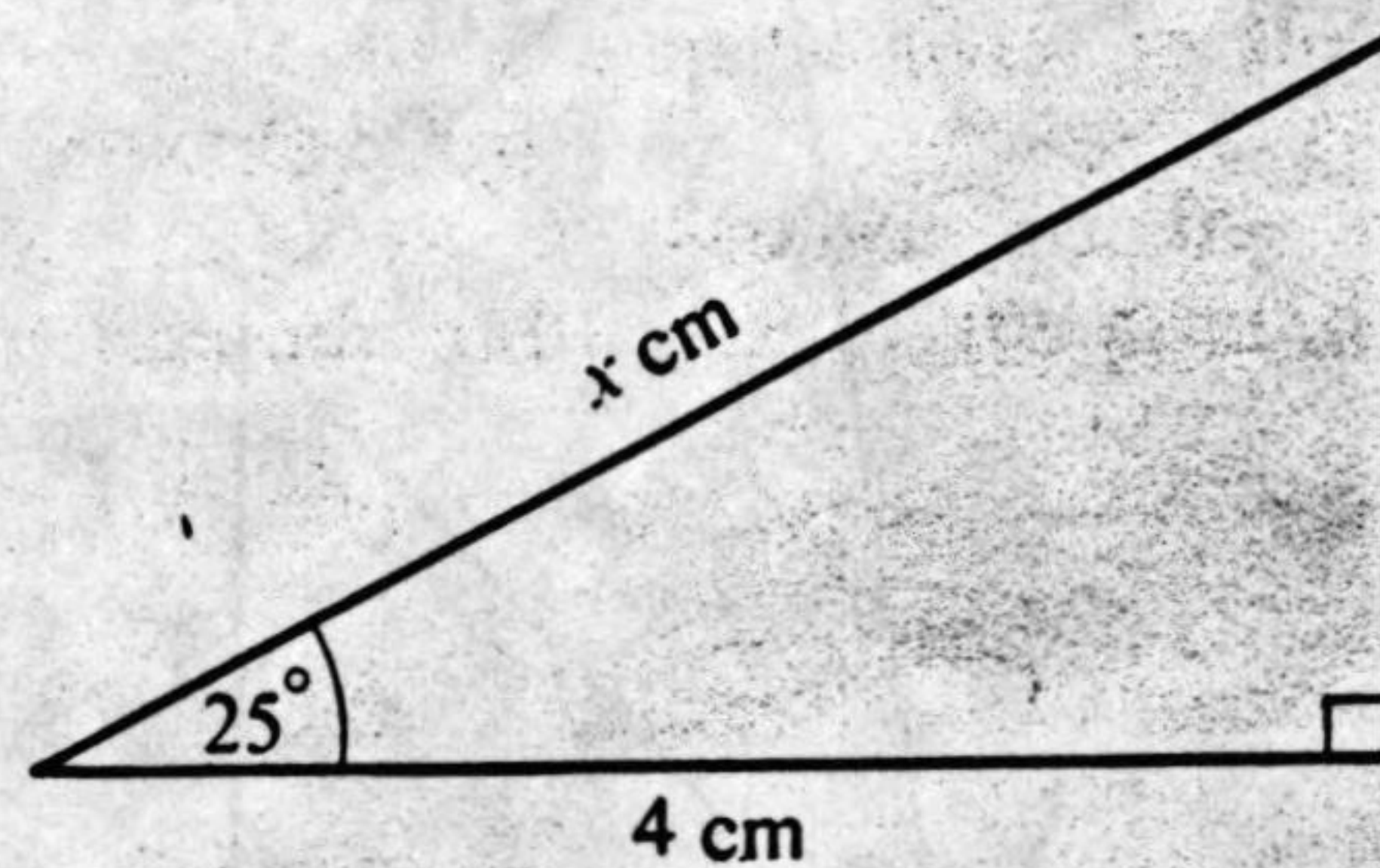**38.** What value of x makes $\begin{pmatrix} x \\ 6 \end{pmatrix}$ a scalar multiple of $\begin{pmatrix} 3 \\ -2 \end{pmatrix}$?

A -9

B -4

C -3

D 9

E 11

39. The probability that a bus will depart on time is $\frac{1}{3}$. In 3 journeys, the probability that the bus will depart late only on the last journey is

A $\dfrac{4}{27}$

B $\dfrac{4}{9}$
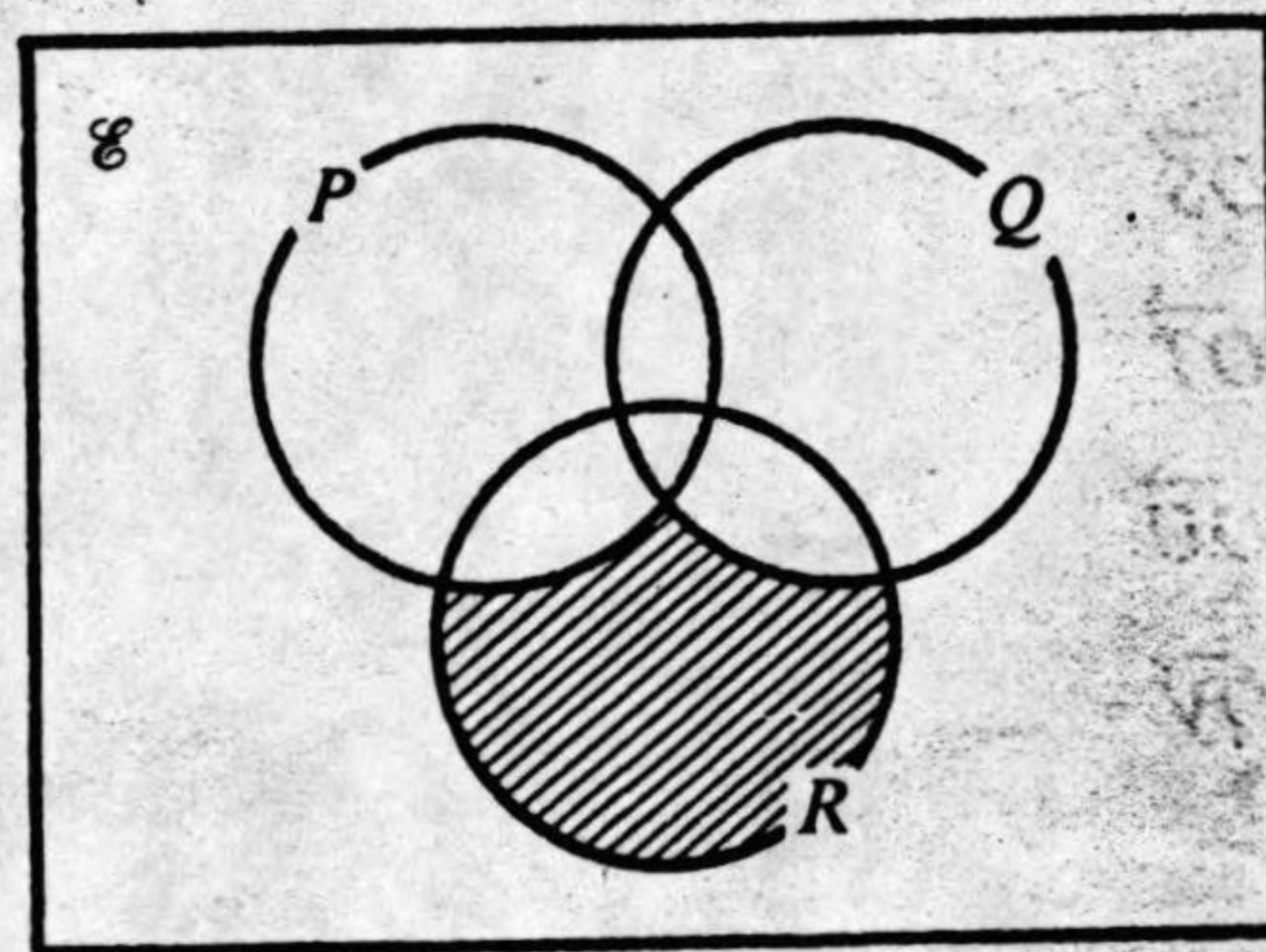
C $\dfrac{2}{27}$

D $\dfrac{2}{9}$

E $\dfrac{1}{3}$

40.

$x =$

A $4 \sin 25°$

B $4 \cos 25°$

C $4 \tan 25°$

D $\dfrac{4}{\sin 25°}$

E $\dfrac{4}{\cos 25°}$

41.

In the Venn diagram the shaded region represents

A $P' \cup Q'$

B $(P \cup Q)'$

C $(P \cup Q)' \cap R$

D $(P \cap Q)' \cup R$

E $(P' \cup Q') \cap R$
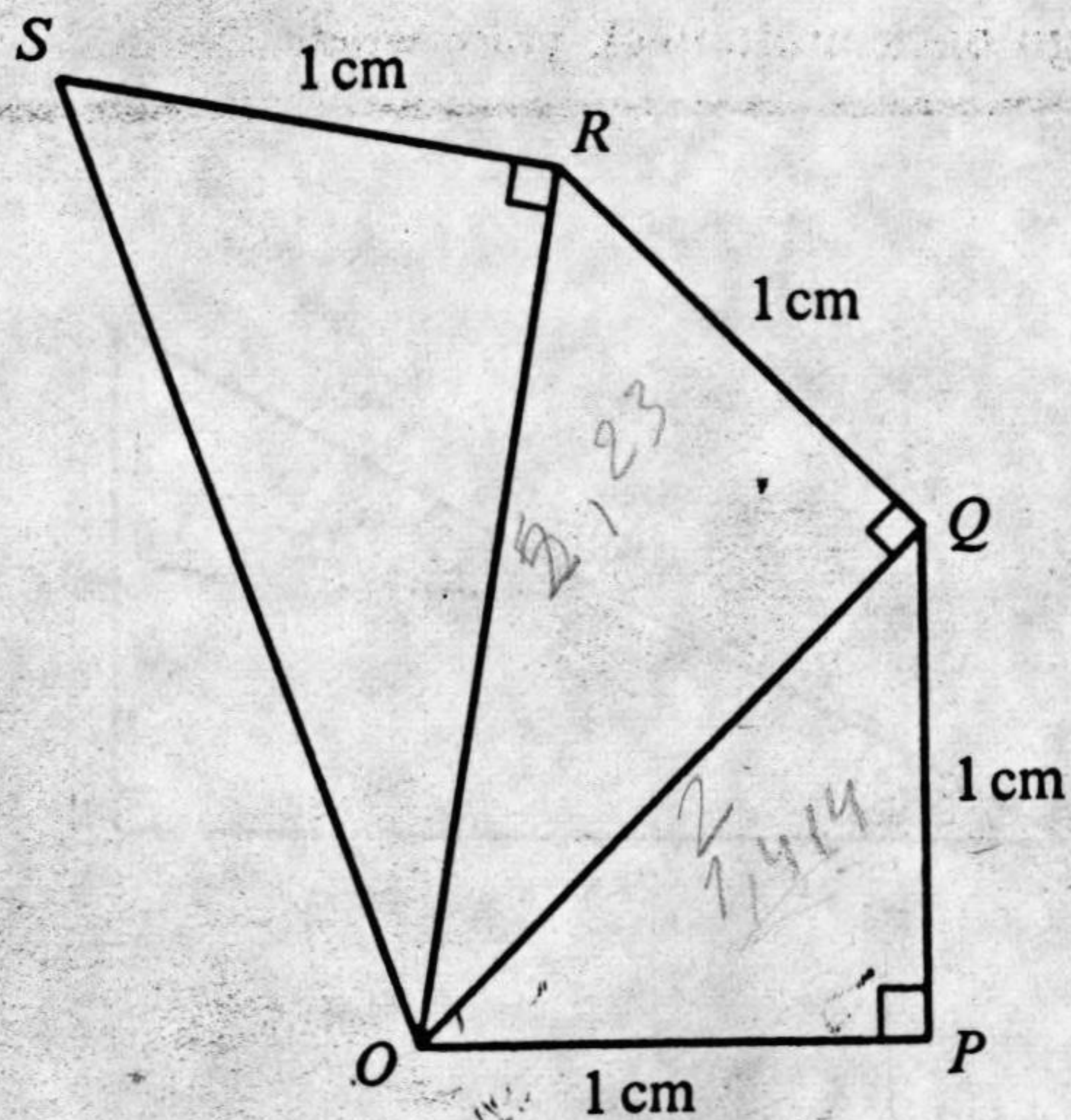
42. y is inversely proportional to x and $y = 54$ when $x = 4$.
Given that $x = 9$, then $y =$

A $10\frac{2}{3}$

B 24

C 36

D 81

E $121\frac{1}{2}$

43.

The length, in centimetres, of OS is

A $\sqrt{2}$

B $\sqrt{3}$

C 2

D $2\sqrt{2}$

E 3

44. Given that $m^{\frac{1}{3}} = n^2$, then $m =$

A $\frac{2}{3}n$

B $\frac{3}{2}n$

C $n^{\frac{2}{3}}$

D $n^{\frac{5}{3}}$

E n^6

45. Given that $\mathbf{M} = \begin{pmatrix} x & 9 \\ 1 & x \end{pmatrix}$ and $\mathbf{M}^2 = \begin{pmatrix} 25 & 18x \\ 2x & 25 \end{pmatrix}$, then $x =$

A $\frac{1}{2}$

B 8

C 4 or −4

D 5 or −5

E 16 or −16

46. Given that $(8)^{2x} = 2$, then $x =$

A −3

B −1

C 0

D $\frac{1}{8}$

E $\frac{1}{6}$

47. Given that $x - 2$ is a factor of $4x^2 - 3x + p$, then $p =$

A 10

B 2

C − 2

D −10

E −22

48. A chord of a circle has length 20 cm and subtends an angle of 100° at the centre of the circle. The radius, in cm, of the circle is

A 10 sin 50°

B $\dfrac{10}{\sin 50°}$

C 20 sin 100°

D $\dfrac{10}{\sin 100°}$

E $\dfrac{20}{\sin 100°}$

49. Given that the bearing of P from Q is 230°, then the bearing of Q from P is

A 320°

B 140°

C 130°

D 050°

E 040°

50. For the function f : $x \mapsto 2^x$, taking the domain to be $-3 < x < 3$, the range is

A $-6 < f(x) < 6$

B $-\frac{1}{6} < f(x) < 6$

C $\frac{1}{6} < f(x) < 6$

D $-\frac{1}{8} < f(x) < 8$

E $\frac{1}{8} < f(x) < 8$

STOP
Now go back and check your work