

SULIT

1449/1
ppr maths nbk

1449/1
Matematik
Kertas 1
Oktober
2007
 $1\frac{1}{4}$ jam



SEKTOR SEKOLAH BERASRAMA PENUH
BAHAGIAN SEKOLAH
KEMENTERIAN PELAJARAN MALAYSIA

PEPERIKSAAN DIAGNOSTIK
TINGKATAN 4 2007

MATEMATIK

Kertas 1

Satu jam lima belas minit

JANGAN BUKA KERTAS SOALAN INI SEHINGGA DIBERITAHU

1. Kertas soalan ini adalah dalam Bahasa Inggeris.
2. Calon dikehendaki membaca maklumat di halaman 2.

Kertas soalan ini mengandungi 23 halaman bercetak.

INFORMATION FOR CANDIDATES

1. *This question paper consists of 40 questions.*
2. *Answer **all** questions.*
3. *Answer each question by blackening the correct space on the answer sheet.*
4. *Blacken only **one** space for each question.*
5. *If you wish to change your answer, erase the blackened mark that you have done. Then blacken the space for the new answer.*
6. *The diagrams in the questions provided are not drawn to scale unless stated.*
7. *A list of formulae is provided on page 3 to 4.*
8. *You may use a non-programmable scientific calculator.*

MATHEMATICAL FORMULAE

The following formulae may be helpful in answering the questions. The symbols given are the ones commonly used.

RELATIONS

$$1 \quad a^m \times a^n = a^{m+n}$$

$$2 \quad a^m \div a^n = a^{m-n}$$

$$3 \quad (a^m)^n = a^{mn}$$

$$4 \quad A^{-1} = \frac{1}{ad-bc} \begin{pmatrix} d & -b \\ -c & a \end{pmatrix}$$

$$5 \quad P(A) = \frac{n(A)}{n(S)}$$

$$6 \quad P(A') = 1 - P(A)$$

$$7 \quad \text{Distance} = \sqrt{(x_1 - x_2)^2 + (y_1 - y_2)^2}$$

$$8 \quad \text{Midpoint, } (x, y) = \left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2} \right)$$

$$9 \quad \text{Average speed} = \frac{\text{distance travelled}}{\text{time taken}}$$

$$10 \quad \text{Mean} = \frac{\text{sum of data}}{\text{number of data}}$$

$$11 \quad \text{Mean} = \frac{\text{sum of (class mark} \times \text{frequency)}}{\text{sum of frequencies}}$$

12 Pythagoras Theorem

$$c^2 = a^2 + b^2$$

$$13 \quad m = \frac{y_2 - y_1}{x_2 - x_1}$$

$$14 \quad m = - \frac{\text{y-intercept}}{\text{x-intercept}}$$

SHAPES AND SPACE

$$1 \quad \text{Area of trapezium} = \frac{1}{2} \times \text{sum of parallel sides} \times \text{height}$$

$$2 \quad \text{Circumference of circle} = \pi d = 2\pi r$$

$$3 \quad \text{Area of circle} = \pi r^2$$

$$4 \quad \text{Curved surface area of cylinder} = 2\pi r h$$

$$5 \quad \text{Surface area of sphere} = 4\pi r^2$$

$$6 \quad \text{Volume of right prism} = \text{cross sectional area} \times \text{length}$$

$$7 \quad \text{Volume of cylinder} = \pi r^2 h$$

$$8 \quad \text{Volume of cone} = \frac{1}{3} \pi r^2 h$$

$$9 \quad \text{Volume of sphere} = \frac{4}{3} \pi r^3$$

$$10 \quad \text{Volume of right pyramid} = \frac{1}{3} \times \text{base area} \times \text{height}$$

$$11 \quad \text{Sum of interior angles of a polygon} = (n - 2) \times 180^\circ$$

$$12 \quad \frac{\text{arc length}}{\text{circumference of circle}} = \frac{\text{angle subtended at centre}}{360^\circ}$$

$$13 \quad \frac{\text{area of sector}}{\text{area of circle}} = \frac{\text{angle subtended at centre}}{360^\circ}$$

$$14 \quad \text{Scale factor, } k = \frac{PA'}{PA}$$

$$15 \quad \text{Area of image} = k^2 \times \text{area of object}$$

Answer **all** questions.

1 Round off 0.09207 correct to three significant figures.

- A 0.09200
- B 0.0921
- C 0.0920
- D 0.092

2 $7.26 \times 10^{-6} - 5.3 \times 10^{-7} =$

- A 1.96×10^{-13}
- B 1.96×10^{-6}
- C 6.73×10^{-13}
- D 6.73×10^{-6}

3 $\frac{12.28 \times 10^5}{(4 \times 10^{-3})^2} =$

- A 3.07×10^{10}
- B 3.07×10^{11}
- C 7.675×10^9
- D 7.675×10^{10}

4 A motorcycle moved at a speed of 120km h^{-1} . Find the distance, in m, travelled by the motorcycle in 90 minutes.

A 3.0×10^3

B 1.8×10^5

C 1.08×10^4

D 1.08×10^7

5 Given that $2x - 3 = 7 - 4(3 + x)$, calculate the value of x .

A -2

B $-\frac{1}{3}$

C $\frac{1}{3}$

D 1

6 Given that $\frac{1}{s} = \frac{2r}{1-r}$, then $r =$

A $\frac{1}{1+2s}$

B $1-2s$

C $\frac{1}{3s}$

D $-\frac{1}{1+2s}$

7 Given that $\frac{\sqrt{p}}{2} + 3 = q$, express p in terms of q .

A $p = (2q + 6)^2$

B $p = (2q - 3)^2$

C $p = (2q)^2 - 6$

D $p = (2q - 6)^2$

8 Express $\frac{t}{3} - \frac{4t^2 - 3}{12t}$ as a single fraction in its simplest form.

A $\frac{t}{4}$

B $\frac{1}{4t}$

C $-\frac{4}{t}$

D $-\frac{1}{4t}$

9 $(-2x - y)^2 - 4x(1 - 3x) =$

A $16x^2 + y^2 + 4xy - 4x$

B $16x^2 - y^2 - 4xy - 4x$

C $16x^2 + 4xy$

D $16x^2 - xy$

10 Which of the following statement is true?

- A $\frac{a}{a+b} = \frac{1}{b}$ or $ac + ad = a(c + d)$
- B $3(x + 2) = x + 6$ or $4\left(\frac{1}{2}\right) = 3$
- C $1 + 2 = 3$ and $3 \times 2 = 5$
- D $(m+2)(m-2) = m^2 - 4$ and $ma + am = a^2 m^2$

11 Diagram 1 shows that FGH is a tangent to the circle and $EG = EK$.

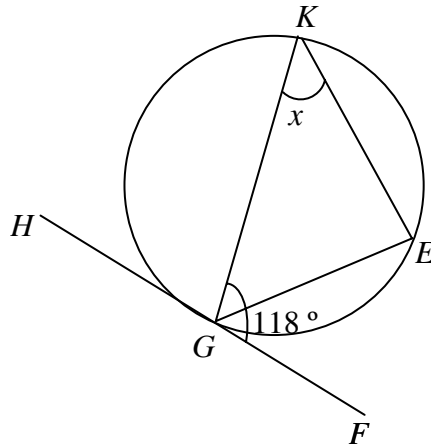


DIAGRAM 1

Find the value of x .

- A 62°
- B 59°
- C 46°
- D 45°

- 12 In Diagram 2, UTV is a tangent to the circle $PQST$ at T . PQR and RST are straight lines.

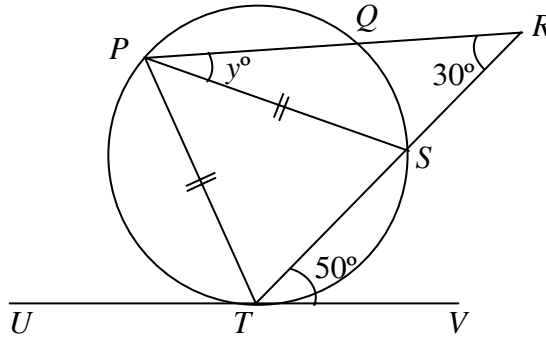


DIAGRAM 2

Calculate the value of y .

- A 15
 - B 20
 - C 30
 - D 35
- 13 Table 1 shows the scores obtained by a group of participants in a competition.

Score	1	2	3	4	5
Frequency	2	5	5	8	10

TABLE 1

Find the difference between the mode and the median of the data.

- A 0
- B 1
- C 2
- D 4

- 14 Diagram 3 is a pictograph showing the number of three types of stationary sold by a shop in a particular week. The ratio of the number of pens to the number of erasers is 3:2.

Pen	⊖ ⊖ ⊖ ⊖ ⊖ ⊖
Ruler	⊖ ⊖ ⊖
Eraser	

⊖ represents 1 dozen of stationary

DIAGRAM 3

Find the total number of rulers and erasers sold in that week.

- A 48
 - B 72
 - C 84
 - D 100
- 15 Diagram 4 shows five triangles drawn on a square grid.

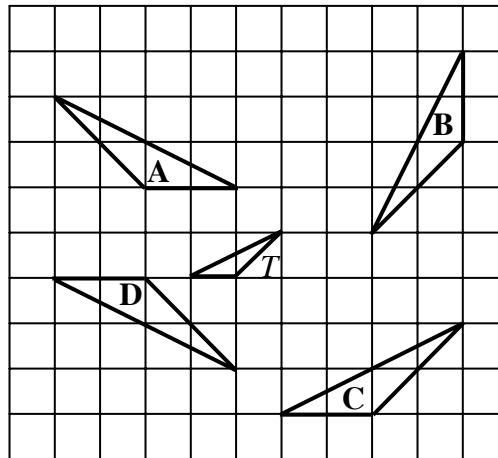


DIAGRAM 4

Which of the triangles, **A**, **B**, **C** or **D** is the image of triangle *T* under an enlargement with a scale factor of 2?

- 16 In Diagram 5, MLK is a straight line.

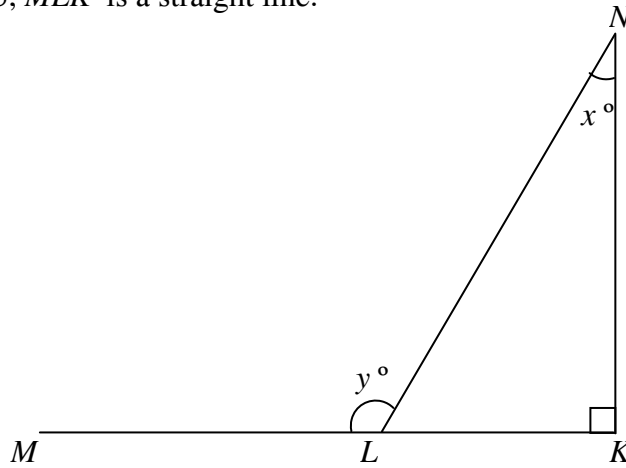


DIAGRAM 5

Given that $\sin x^\circ = \frac{5}{13}$, then $\tan y^\circ =$

- A $-\frac{12}{5}$
 B $-\frac{5}{12}$
 C $\frac{5}{12}$
 D $\frac{12}{5}$

- 17 Given that $\cos x = -0.6520$. Calculate the possible values of x if $0^\circ \leq x \leq 360^\circ$.

- A $130^\circ 42'$ and $229^\circ 18'$
 B $130^\circ 42'$ and $220^\circ 42'$
 C $139^\circ 18'$ and $220^\circ 42'$
 D $139^\circ 18'$ and $229^\circ 18'$

- 18 Diagram 6 shows a Venn diagram with the universal set, $\xi = K \cup L \cup M$.

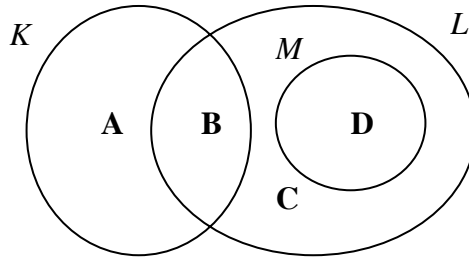


DIAGRAM 6

Which of the region, **A**, **B**, **C** or **D**, represents the set $(K \cap L)' \cap M$?

- 19 Diagram 7 shows a Venn diagram with the universal set $\xi = \{ \text{Form Five students} \}$, set $F = \{ \text{Students who can speak French} \}$ and set $J = \{ \text{Students who can speak Japanese} \}$.

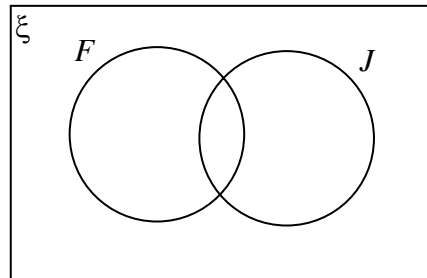


DIAGRAM 7

Given that $n(F) = 44$, $n(J) = 36$, $n(\xi) = 80$ and the number of students who can only speak Japanese is 28, find the number of students who can not speak French or Japanese.

- A** 8
B 14
C 28
D 34

- 20 Diagram 8 shows two straight lines JL and ON on a Cartesian plane where O is the origin.

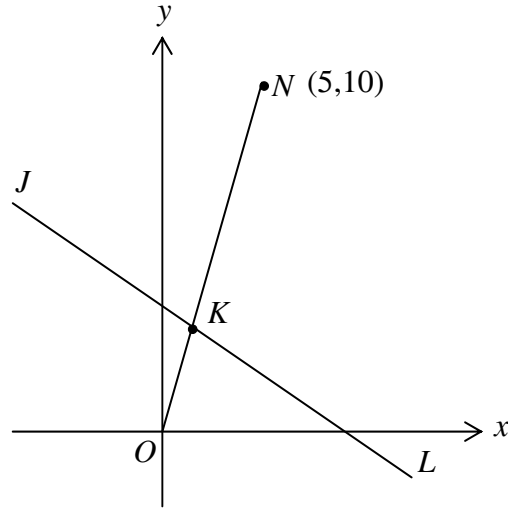


DIAGRAM 8

The two straight lines intersect at point K . Given that the equation of JL is $3y + 2x = 4$. Find the coordinates of K .

- A $(1, 4)$
B $\left(\frac{1}{2}, 1\right)$
C $\left(\frac{3}{2}, 2\right)$
D $\left(\frac{3}{2}, 3\right)$

- 21 In Diagram 9, JKL is a straight line and $JM = KM$.

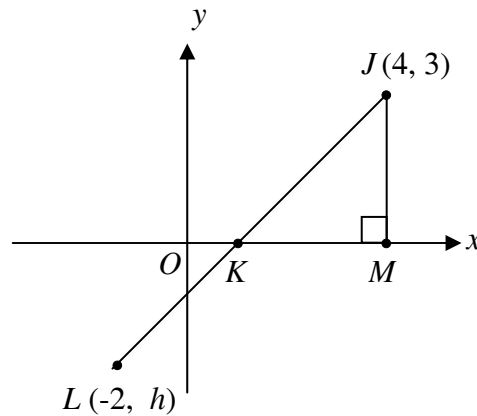


DIAGRAM 9

Find the value of h .

- A -1
 B -2
 C -3
 D -4
- 22 Table 2 is a frequency table which shows the masses of students in a class.

Mass (kg)	Frequency
51 – 53	3
54 – 56	5
57 – 59	6
60 – 62	4
63 – 65	2

TABLE 2

Calculate the mean mass, in kg, of the students.

- A 56.55
 B 57.55
 C 58.55
 D 60.05

- 23 Diagram 10 shows triangles V and W drawn on a square grid.

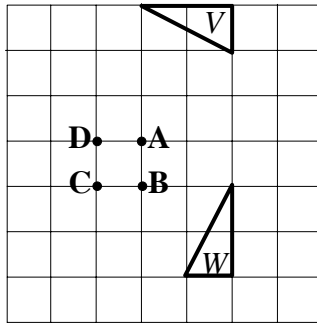


DIAGRAM 10

Triangle W is the image of triangle V under clockwise rotation of 90° . Which of the points, A , B , C or D , is the centre of rotation?

24 $64^{\frac{2}{3}} \times 243^{\frac{3}{5}} \div 2 \div \sqrt{81} =$

- A 4
- B 8
- C 12
- D 24

25 Simplify $(x^2y)^3 \div x^{-5}y^{-7}$.

- A xy^{-4}
- B x^3y^{-4}
- C $x^{11}y^{10}$
- D $x^{13}y^{10}$

- 26 Diagram 11 shows a regular pentagon $JKLMN$. FGH is a straight line.

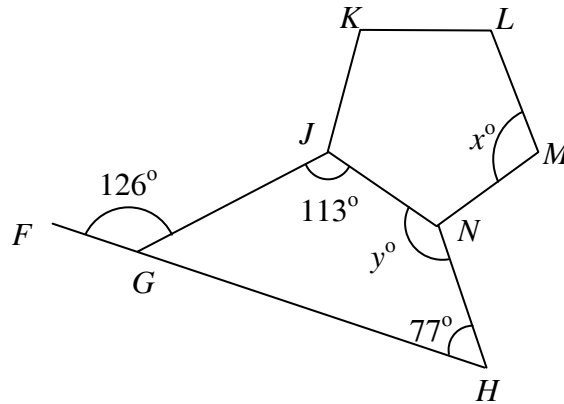


DIAGRAM 11

Calculate the value of $y - x$.

- A 116
 B 108
 C 80
 D 8
- 27 A number is chosen at random from set $P = \{x : x \text{ is an integer and } 2 < x \leq 12\}$. Find the probability that the number chosen is a prime factor of 6.

- A $\frac{1}{10}$
 B $\frac{1}{5}$
 C $\frac{3}{10}$
 D $\frac{2}{5}$

- 28 Diagram 12 shows a pentagon $KLMNP$. Given that KL and NP are parallel to each other.

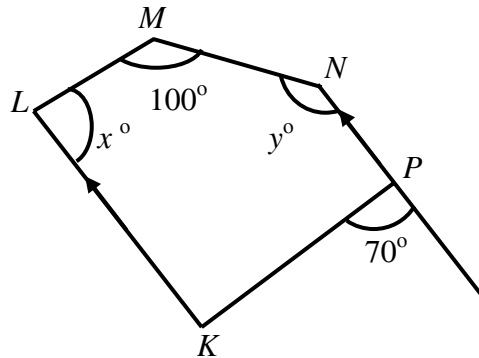
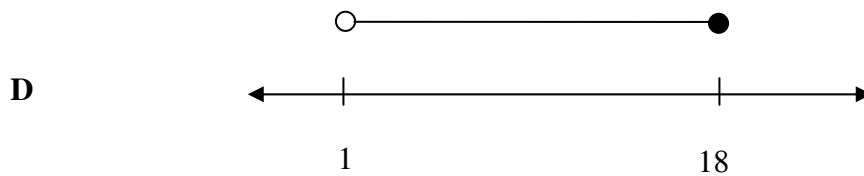
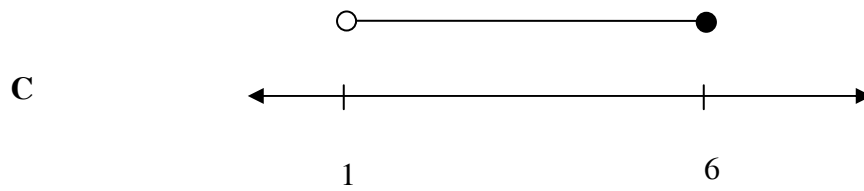
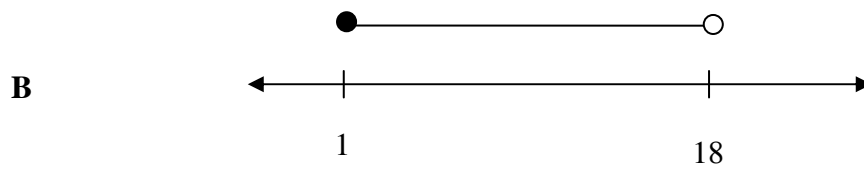
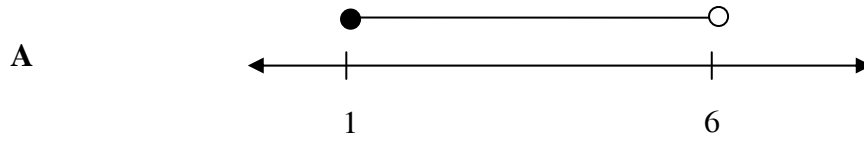


DIAGRAM 12

Find the value of $x + y$.

- A 216
 B 222
 C 250
 D 260
- 29 If $m < 12 - 2m \leq 11 - m$, then the integers m that satisfy the inequalities are
- A 1, 2, 3, 4
 B 0, 1, 2, 3, 4
 C 1, 2, 3
 D 2, 3, 4

30 The number line that represents the solution for $1 \leq 3x - 2 < 16$ is



31 Diagram 13 is a Venn diagram showing the elements of sets ξ , P , Q and R .

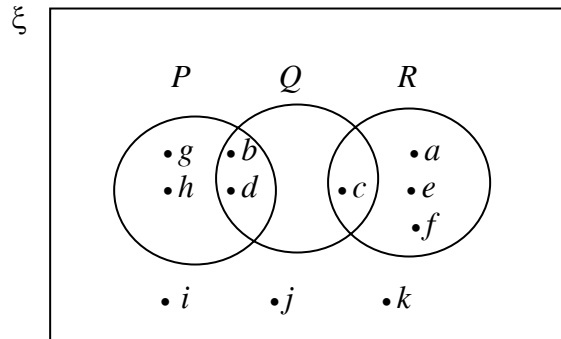


DIAGRAM 13

Find $n[(P \cup Q) \cap Q']$

- A 2
- B 3
- C 5
- D 6

32 In Diagram 14, O is the origin. The straight line JK is parallel to the straight line OL .

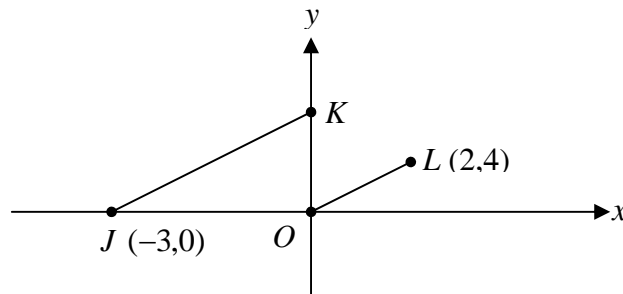


DIAGRAM 14

Calculate the coordinates of K .

- A (0, -2)
- B (0, 2)
- C (0, 6)
- D (0, 9)

- 33 In Diagram 15, QST is a straight line.

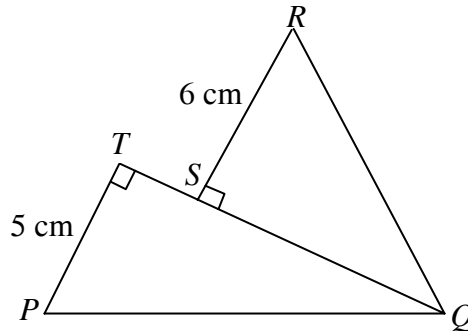


DIAGRAM 15

Given $\tan \angle PQT = \frac{5}{12}$ and $\sin \angle SQR = \frac{3}{5}$. Calculate, in cm, the length of TS .

- A 2
B 3
C 4
D 5
- 34 Table 3 shows the marks obtained by 50 students in a mathematics test.

Marks	Frequency
20 – 29	10
30 – 39	16
40 – 49	4
50 – 59	15
60 – 69	5

TABLE 3

Determine the median class.

- A 20 – 29
B 30 – 39
C 40 – 49
D 50 – 59

- 35 Table 4 shows the results of a study conducted on a group of 60 students and the food they bought at the canteen.

Type of food	Number of students
Fried noodles	n
Nasi lemak	24
Bread	p
Roti canai	10

TABLE 4

If a student, chosen at random from the group, had a probability of $\frac{1}{4}$ in buying fried noodles, calculate the value of p .

- A 11
B 13
C 15
D 26
- 36 Diagram 16 shows the circle STQ with centre O . PQR and RS are tangents to the circle at Q and S respectively.

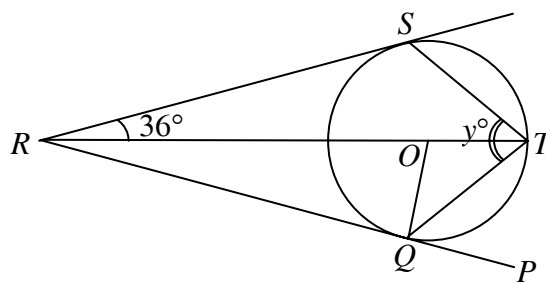


DIAGRAM 16

Find the value of y .

- A 27
B 36
C 54
D 72

- 37 In Diagram 17 below, JK and LM are two vertical poles on a horizontal plane.

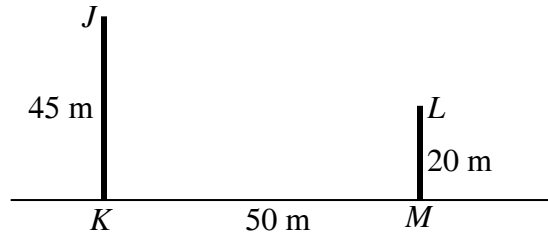


DIAGRAM 17

Calculate the angle of depression of peak L from peak J .

- A $24^\circ 40'$
 B $26^\circ 34'$
 C $56^\circ 35'$
 D $63^\circ 26'$
- 38 Diagram 18 shows a steel frame placed on a horizontal plane. PQ and RST are vertical while PS is horizontal. Given that the angle of elevation of point R from point Q is 68° .

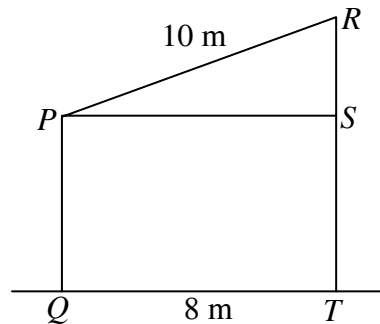


DIAGRAM 18

The height of PQ is

- A 8
 B 8.9
 C 10
 D 13.8

- 39 Diagram 19 shows a cuboid with a horizontal rectangular base $KLMN$.

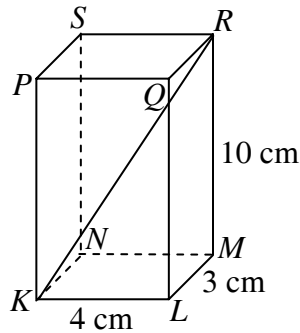


DIAGRAM 19

The angle between the line KR and the base $KLMN$ is

- A $26^\circ 34'$
 - B $53^\circ 8'$
 - C $63^\circ 26'$
 - D $68^\circ 12'$
- 40 Diagram 20 shows a cuboid with a horizontal base $TUVW$. M is the midpoint of TU .

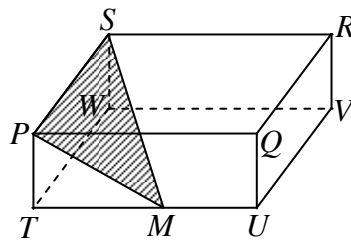


DIAGRAM 20

Determine the angle between the plane PSM and the horizontal base $TUVW$.

- A $\angle PMT$
- B $\angle TMS$
- C $\angle SMW$
- D $\angle MPQ$

END OF QUESTION PAPER

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