

**MODULE 9**  
**MATEMATIK SPM "ENRICHMENT"**  
**TOPIC: LINES AND PLANES IN 3-DIMENSIONS**  
**TIME: 2 HOURS**

- 1 Diagram 2 shows a prism with cross section  $BCRQ$ . Given  $T$  and  $U$  are the midpoint of  $AD$  and  $BC$  respectively,  $P$  and  $Q$  are right above  $T$  and  $U$  respectively and  $PQRS$  is a square.

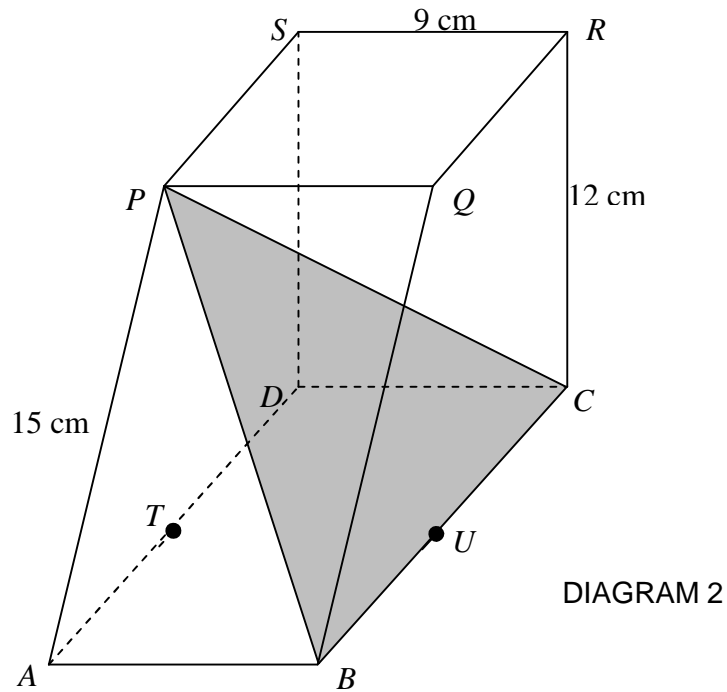


DIAGRAM 2

Calculate the angle between plane  $PBC$  and plane  $BCRQ$ .

[4 marks]

Answer :

2 Diagram 2 shows a cuboid with base  $TUVW$ .

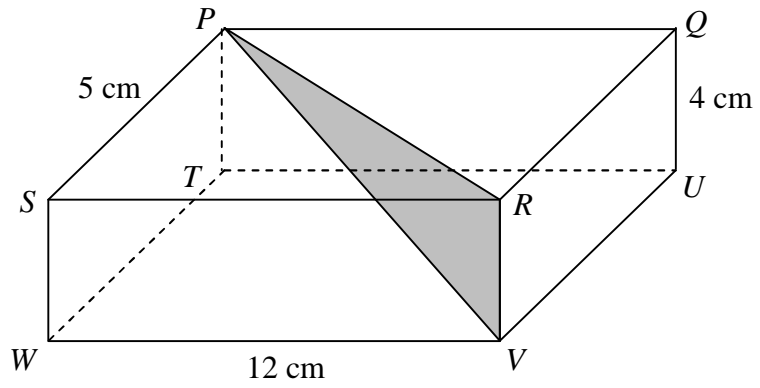


DIAGRAM 2

Calculate the angle between plane  $PRV$  and plane  $QRVU$ .

[4 marks]

Answer :

3

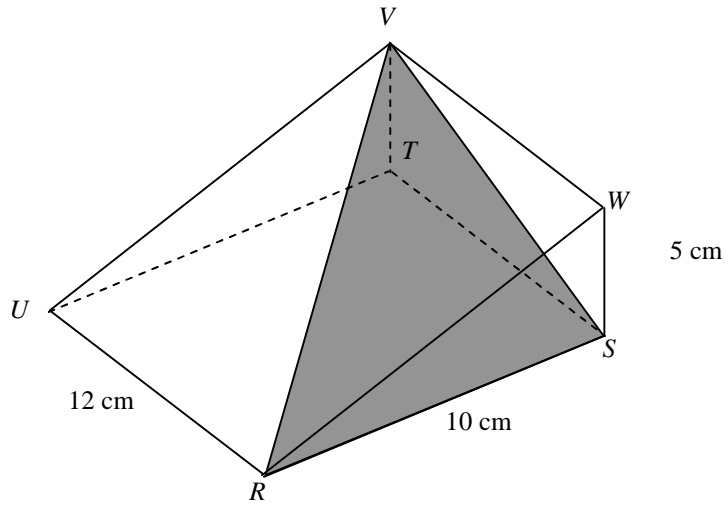


DIAGRAM 3

Diagram 3 shows a right prism with horizontal rectangle base. Right triangle RSW and UTV are the uniform cross section of the prism. Calculate the angle between plane SRV and plane RSTU.

[4 marks]

Answer :

- 4 Diagram 4 shows a pyramid with a horizontal square base  $ABCD$ .  $T$  and  $U$  are the midpoints of sides  $AB$  and  $CD$  respectively. The height of the pyramid is 6 cm.

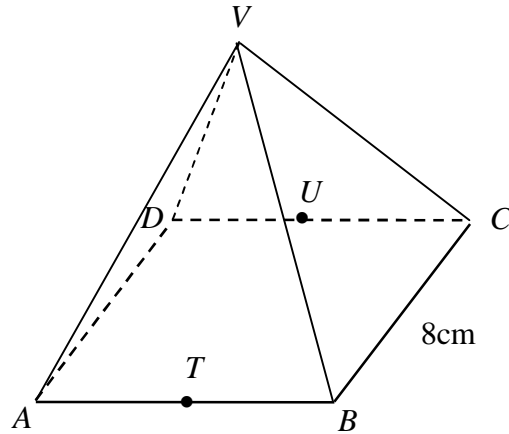


DIAGRAM 4

Calculate the angle between the line  $VT$  and the base  $ABCD$ .

[4 marks]

Answer :

- 5 Diagram 5 shows a cuboid  $PQRSDEFG$  with a horizontal square base  $PQRS$ .

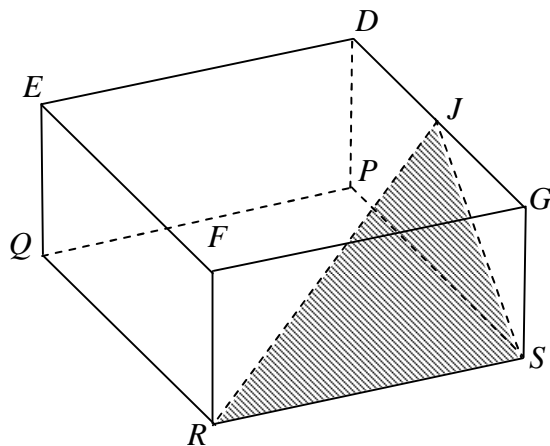


DIAGRAM 5

$J$  is the midpoint of  $DG$ .  $QR = RS = 12$  cm and  $FR = 8$  cm.  
Calculate the angle between the plane  $JRS$  and the plane  $RSGF$ .

[4 marks]

Answer :

- 6 Diagram 6 shows a right prism with an isosceles triangle base, STU. The isosceles triangle STU is the uniform cross-section of the prism.

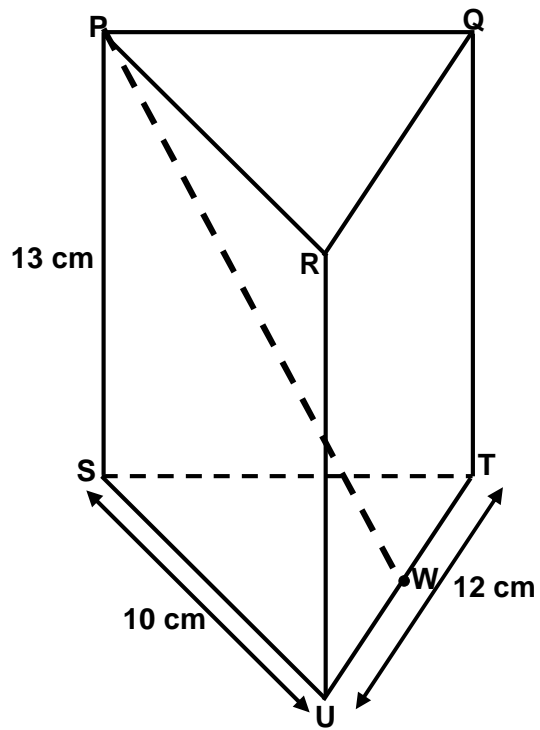


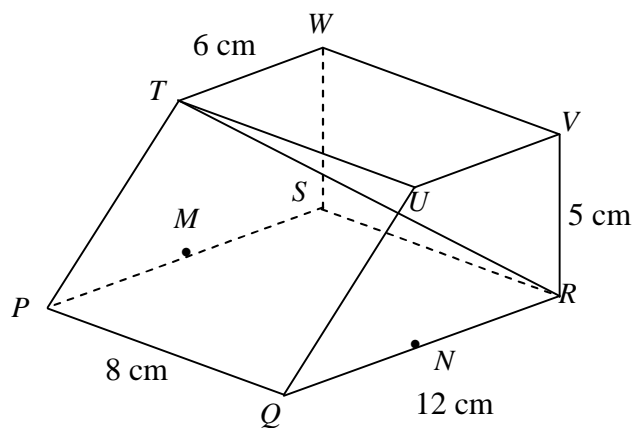
DIAGRAM 6

ST = SU and W is the midpoint of TU.  
Calculate the angle between the line PW and the base STU.

[4 marks]

Answer :

- 7 Diagram 7 shows a right prism with a horizontal rectangular base  $PQRS$ .  $VUQR$  is a trapezium.  $M$  and  $N$  are the midpoints of  $PS$  and  $QR$  respectively. Calculate the angle between the line  $TR$  and the base  $PQRS$ .



[4 marks]

DIAGRAM 2

- 8 Diagram 8 shows a right prism. Right angled triangle  $PQR$  is the uniform cross-section of the prism.

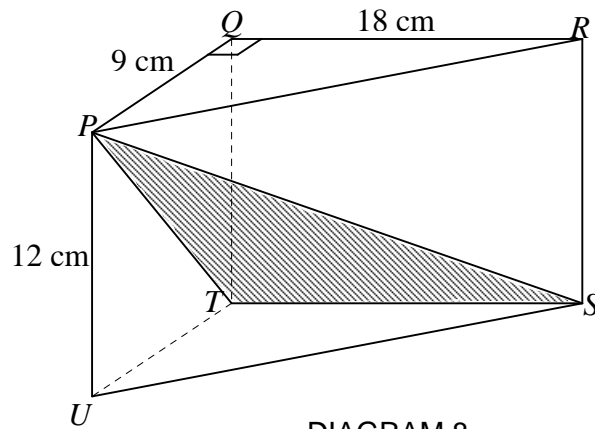


DIAGRAM 8

- (a) Name the angle between the plane  $STP$  and the plane  $STQR$ ,  
(b) Calculate the angle between the plane  $STP$  and the plane  $STQR$ .

[4 marks]

Answer :

(a)

(b)

9 Diagram 9 shows a right prism with a horizontal rectangular base  $PQRS$ .

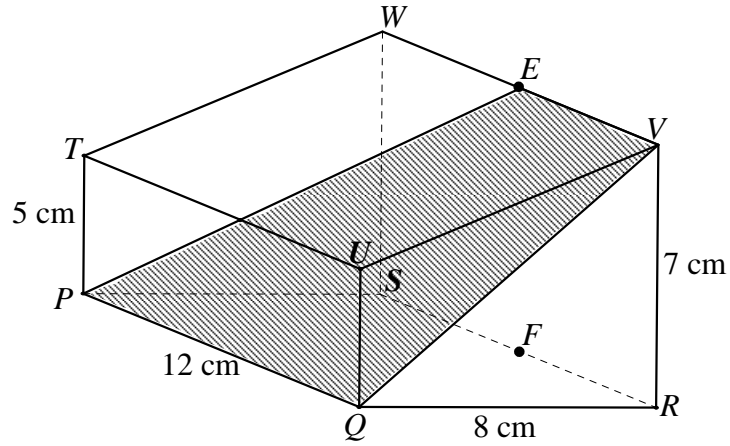


DIAGRAM 9

Given that  $E$  and  $F$  are midpoints of  $WV$  and  $SR$  respectively.

- (a) Find the length of  $PF$
- (b) Calculate the angle between the line  $PE$  and the plane  $PQRS$
- (c) Name the angle between the plane  $PQVE$  and the plane  $PQUT$ .

[6 marks]

Answer:

(a)

(b)

(c)

10

Diagram 10 shows a cuboid with a rectangular base  $PQRS$ .  $M$  and  $N$  are midpoints of  $TU$  and  $PQ$  respectively.

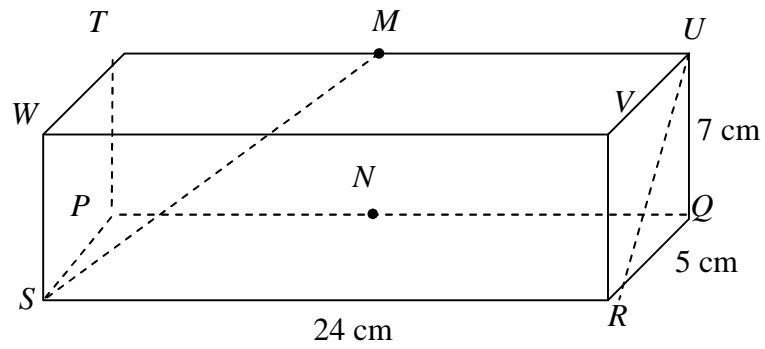


DIAGRAM 10

- (a) Calculate the length of  $SN$
  - (b) Calculate the angle between the line  $SM$  and the plane  $TUVW$
  - (c) Name the angle between the plane  $SRUM$  and the plane  $PQUT$
- [6 marks]

Answer :

(a)

(b)

(c)

**MODULE 9 - ANSWERS**  
**TOPIC: LINES AND PLANES IN 3-DIMENSIONS**

1 Identify  $\angle PUQ$  @  $\angle SCR$   
 $\tan \angle PUQ = \frac{9}{12}$   
 $\angle PUQ = 36^{\circ} 52' @ 36.87^{\circ}$

2 Identify  $\angle PRQ$   
 $\tan \angle PRQ = \frac{12}{5}$   
 $\angle PRQ = 67.38^{\circ}$  or  $67^{\circ} 22'$

3 Identify  $\angle VST$   
 $\tan \angle VST = \frac{5}{12}$   
 $22.6^{\circ}$  or  $22^{\circ} 37'$

4 Identify  $\angle VTU$   
 $\tan \angle VTU = \frac{6}{4}$   
 $\angle VTU = 56.31^{\circ}$  or  $56^{\circ} 18'$

5 Identify  $\angle GSJ$   
 $\tan \angle GSJ = \frac{6}{8}$   
 $36.87^{\circ}$  or  $36^{\circ} 52'$

6 Identify  $\angle PWS$   
 $\tan \angle PWS = \frac{13}{\sqrt{10^2 - 6^2}}$   
 $\angle PWS = 58.39^{\circ}$  or  $58.4^{\circ}$  or  $58^{\circ} 24'$

7 Identify  $\angle TRM$   
 $\tan \angle TRM = \frac{5}{\sqrt{8^2 + 6^2}}$   
 $\angle TRM = 26.57^{\circ}$  or  $26^{\circ} 34'$

8 Identify  $\angle PTQ$  or  $\angle QTP$   
 $\tan \angle PTQ = \frac{9}{12}$   
 $\angle PTQ = 36^{\circ} 52'$  or  $36.9^{\circ}$

- 9
- a) 10
  - b) Identify  $\angle EPF$   
 $\text{Tan } \angle EPF = \frac{7}{10}$   
 $34^{\circ} 59'$
  - c)  $\angle UQV$
- 10
- a) 13 cm
  - b) Identify  $\angle SMW$   
 $\text{tan } \angle SMW = \frac{7}{13}$   
 $28.3^{\circ}$  or  $28^{\circ} 18'$
  - c)  $\angle RUQ$  or  $\angle QUR$