

## Topic test 12

# Further trigonometry

- Time allowed: 45 minutes
- Part A: 20 multiple-choice questions (40 marks)
- Part B: 14 free-response questions (60 marks)

Name: \_\_\_\_\_

### Part A

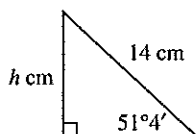
20 multiple-choice questions

2 marks each: 40 marks

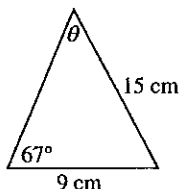
Circle the correct answer.

- 1 Evaluate  $4 \tan 39^\circ 20'$ .  
 A 1.3985                      B 2.7505  
 C 3.2623                      D 3.2779
- 2 If  $\cos K = -0.4412$ , what is the value of  $K$ ?  
 A  $64^\circ$                         B  $-64^\circ$   
 C  $100^\circ$                       D  $116^\circ$
- 3 Evaluate  $\frac{15 \sin 38^\circ}{\sin 11^\circ}$ .  
 A 0.90                         B 1.76  
 C 6.81                         D 48.40
- 4 Evaluate  $16^2 + 14^2 - 2 \times 16 \times 14 \cos 40^\circ$ .  
 A 3.06  
 B 108.81  
 C 280.41  
 D 556.81

- 5 Find  $h$ .  
 A 10.89  
 B 11.31  
 C 17.33  
 D 18.00



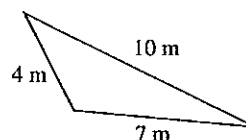
- 6 Find  $\theta$ .  
 A  $34^\circ$   
 B  $35^\circ$   
 C  $37^\circ$   
 D  $55^\circ$



- 7  $\tan 140^\circ$  is the same as:  
 A  $\tan 40^\circ$   
 B  $\tan 100^\circ$   
 C  $-\tan 40^\circ$   
 D  $-\tan 100^\circ$

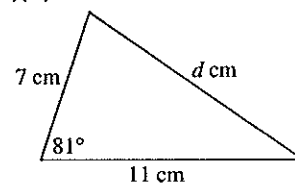
- 8 If  $M$  is obtuse and  $\sin M = \frac{2}{5}$ , which of the following is approximately equal to  $M$ .  
 A  $24^\circ$                         B  $70^\circ$   
 C  $110^\circ$                       D  $156^\circ$

- 9 If the largest angle in this triangle is  $\theta$ , which one of the formulas below is correct?

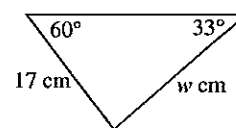


- A  $\cos \theta = \frac{4^2 + 7^2 - 10^2}{2 \times 4 \times 7}$
- B  $\cos \theta = \frac{4^2 + 10^2 - 7^2}{2 \times 4 \times 10}$
- C  $\cos \theta = \frac{7^2 + 10^2 - 4^2}{2 \times 7 \times 10}$
- D  $\cos \theta = \frac{10^2 + 7^2 - 4^2}{2 \times 7 \times 4}$

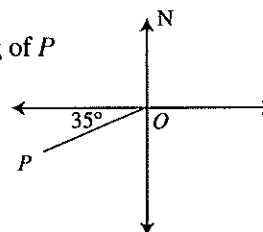
- 10 Find  $d$ .  
 A 12.08  
 B 12.57  
 C 14.59  
 D 17.90



- 11 Find  $w$ .  
 A 8.02  
 B 10.69  
 C 27.03  
 D 31.21



- 12 What is the bearing of  $P$  from  $O$ ?  
 A  $125^\circ$   
 B  $145^\circ$   
 C  $215^\circ$   
 D  $235^\circ$



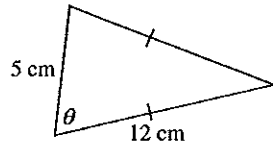
**Topic test 12: Further trigonometry continued**

13  $\sin x$  is negative when:

- A  $x$  is acute
- B  $x$  is obtuse
- C  $x$  is acute or obtuse
- D none of the above

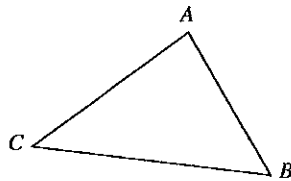
14 Find  $\theta$ .

- A  $70^\circ$
- B  $78^\circ$
- C  $89^\circ$
- D  $102^\circ$



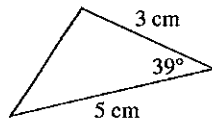
15 In  $\triangle ABC$ ,  $A = 35^\circ$ ,  $b = 17$  cm,  $c = 20$  cm. Find  $a$ .

- A 7.37 cm
- B 11.49 cm
- C 17.29 cm
- D 35.30 cm



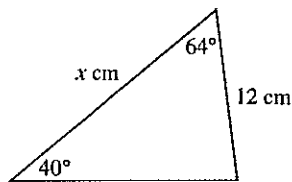
16 Find the area of this triangle.

- A  $3.27 \text{ cm}^2$
- B  $4.72 \text{ cm}^2$
- C  $5.82 \text{ cm}^2$
- D  $9.44 \text{ cm}^2$



17 Find  $x$ .

- A 7.95
- B 16.78
- C 18.11
- D 20.77

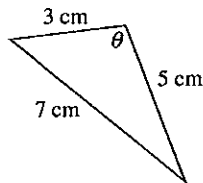


18 In  $\triangle PNG$ ,  $NG = 2$  cm,  $PG = 5$  cm and  $\angle N = 27^\circ$ . Find  $\angle P$ .

- A  $6^\circ$
- B  $10^\circ$
- C  $18^\circ$
- D  $65^\circ$

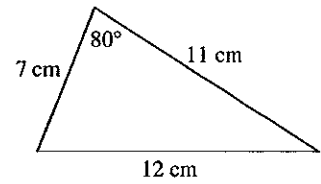
19 Find  $\theta$ .

- A  $60^\circ$
- B  $90^\circ$
- C  $95^\circ$
- D  $120^\circ$



20 Find the area of this triangle.

- A  $37.92 \text{ cm}^2$
- B  $41.36 \text{ cm}^2$
- C  $45.15 \text{ cm}^2$
- D  $45.50 \text{ cm}^2$



**Part B**

14 free-response questions

60 marks

Show working where appropriate.

21 (6 marks) Evaluate each expression correct to the nearest minute.

a  $35^\circ 17' 44''$

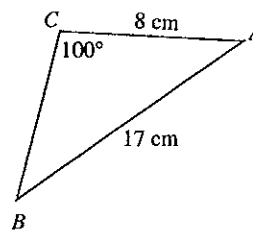
b  $108^\circ 54' 7''$

c  $Y$  when  $\cos Y = 0.5614$

22 (2 marks) Complete:

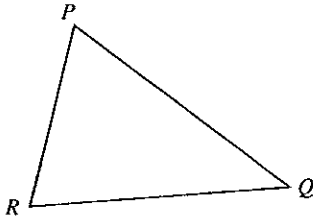
$\cos 130^\circ = -\cos \text{ \_\_\_\_\_\_ }^\circ$ .

23 (3 marks) Find  $\angle A$  correct to the nearest degree.



**Topic test 12: Further trigonometry continued**

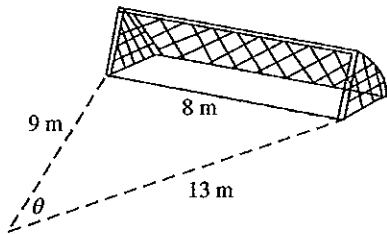
24 (4 marks)



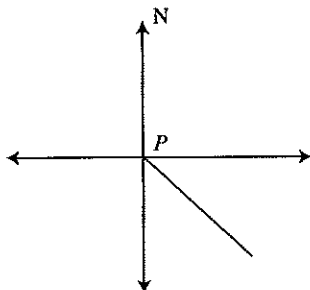
For  $\triangle PQR$ :

- a label on the diagram the sides  $p$ ,  $q$  and  $r$
- b write the cosine rule for finding side  $r$ .

25 (3 marks) A soccer player is 9 m from one goal post and 13 m from the other. The goal is 8 m wide. Within what angle,  $\theta$ , must he kick the ball to score. Answer to the nearest degree.

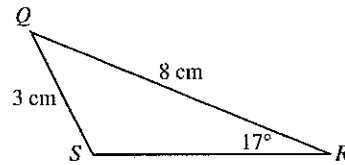


26 (4 marks) Two ships sail from port  $P$ . One sails 14 km due south while the other sails 17 km on a bearing of  $120^\circ$ . Calculate to one decimal place the distance between the ships.

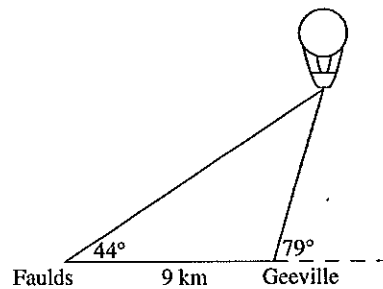


27 (3 marks) If  $\sin \theta = 0.6712$ , then find two answers for  $\theta$ , to the nearest degree.

28 (3 marks) Find  $\angle S$  to the nearest degree if it is obtuse.

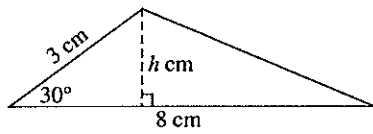


29 (3 marks) Two towns 9 km apart, Faulds and Geeville, observe a hot-air balloon. From Faulds, its angle of elevation is  $44^\circ$  and, from Geeville,  $79^\circ$ . Calculate to two decimal places the distance of the balloon from Faulds.



**Topic test 12: Further trigonometry continued**

30 (6 marks)



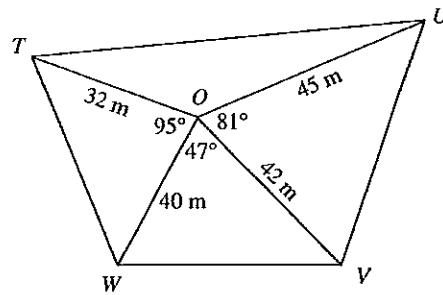
Find the area of this triangle:

a using the formula  $A = \frac{1}{2}ab \sin C$

b by finding  $h$  first, then using  $A = \frac{1}{2}bh$ .

31 (4 marks) In  $\triangle ABC$ ,  $\angle A = 116^\circ$ ,  $\angle B = 58^\circ$  and  $AC = 4$  m. Find the length of  $CB$  correct to two decimal places.

32 (8 marks) The diagram shows the results of a survey of the field  $TUVW$ .



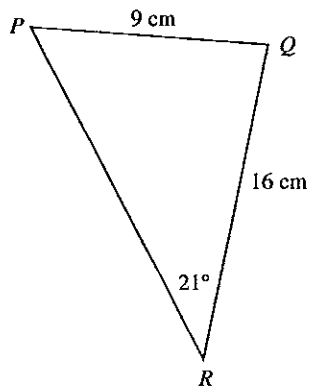
a Show that  $\angle TOU = 137^\circ$ .

b Hence, calculate correct to the nearest metre the length of the boundary  $TU$ .

c Show that area of the entire field  $TUVW$ , to the nearest square metre, is approximately  $2676 \text{ m}^2$ .

**Topic test 12: Further trigonometry continued**

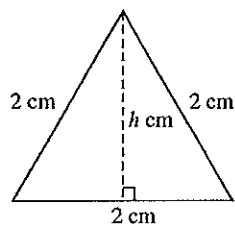
33 (4 marks) Find two possible answers for  $\angle P$  correct to the nearest degree.



b Hence, find the area of the triangle as a surd.

c Use the cosine rule to prove that any angle,  $\theta$ , in this triangle is  $60^\circ$ .

34 (7 marks) This equilateral triangle has sides of length  $2\text{ cm}$  and a perpendicular height of  $h\text{ cm}$ .



a Use Pythagoras' theorem to find the value of  $h$  as an exact surd.

**END OF TEST.**

Use the rest of this page and the back for extra working space.

## ANSWERS TO FURTHER TRIGONOMETRY TOPIC TEST 12

### PART A

1	D	2	D	3	D	4	B	5	A	6	A
7	C	8	D	9	A	10	A	11	C	12	D
13	D	14	B	15	B	16	B	17	C	18	B
19	D	20	A								

### PART B

21a	$35^{\circ}18'$	b	$108^{\circ}54'$	c	$55^{\circ}51'$	22	$-\cos 50^{\circ}$	23	$52^{\circ}$
24a	Check	b	Check	25	$37^{\circ}$	26	15.7 km	27	$42^{\circ}, 138^{\circ}$
28	$129^{\circ}$	29	15.4 km	30a	$6 \text{ cm}^2$	b	$1.5; 6 \text{ cm}^2$	31	4.24 m
32a	$137^{\circ}$	b	72 m	c	491; 933.4; 614.3; 637.6	33	$40^{\circ}; 140^{\circ}$	34a	$\sqrt{3} \text{ cm}$
b	$\sqrt{3} \text{ cm}^2$	c	$60^{\circ}$						

- Updated Aug/06