

# Test 1

## Subjective Test

- (i) All questions are compulsory.
- (ii) Questions 1 to 8 are multiple choice questions carrying one mark each.
- (iii) Questions 9 to 12 are also multiple choice questions carrying two marks each.
- (iv) Questions 13 to 19 are short answer type questions carrying two marks each.
- (v) Questions 20 to 29 are also short answer type questions carrying three marks each.
- (vi) Questions 30 to 34 are long answer type questions carrying four marks each.

### Question 1 (1.0 marks)

Which of the following numbers is irrational?

**A.**

0.0173101731...

**B.**

0.0769207692...

**C.**

0.03899721448...

**D.**

0.50349603496...

### Question 2 (1.0 marks)

What is the remainder when the polynomial,  $x^3 + 7x^2 + 18x + 25$ , is divided by another polynomial  $(x + 4)$ ?

**A.**

1

**B.**

2

**C.**

4

**D.**

5

**Question 3** (1.0 marks)

What is the zero of the polynomial  $p(x) = 3x + 1$ ?

**A.**

-2

**B.**

$-\frac{1}{3}$

**C.**

0

**D.**

$\frac{1}{3}$

**Question 4** (1.0 marks)

How can the expression  $\frac{4}{3-\sqrt{5}}$  be simplified?

**A.**

$3+\sqrt{5}$

**B.**

$4(3+\sqrt{5})$

**C.**

$3-\sqrt{5}$

**D.**

$2(3-\sqrt{5})$

**Question 5** (1.0 marks)

How can the expression  $\left(\frac{x^a}{x^b}\right)^c \left(\frac{x^b}{x^c}\right)^a \left(\frac{x^c}{x^a}\right)^b$  be simplified?

**A.**

1

**B.**

2

**C.**

$x^{abc}$

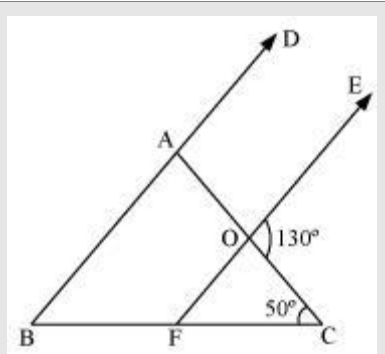
**D.**

$x^{(a-b)c}$

**Question 6** (1.0 marks)

Use the following information to answer the next question.

In the given figure,  $BD \parallel EF$ .



What is the measure of  $\angle ABC$  in the given figure?

**A.**

$55^\circ$

**B.**

$65^\circ$

**C.**

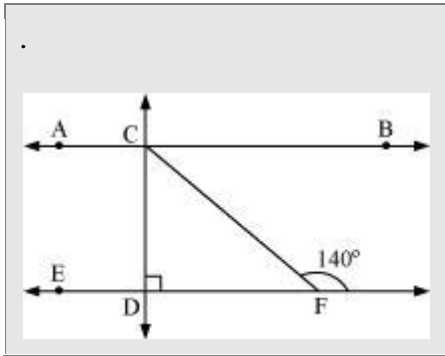
$70^\circ$

**D.**

80°

**Question 7** (1.0 marks)

Use the following information to answer the next question.



If  $AB \parallel EF$ , then what is the measure of  $\angle DCF$ ?

A.

30°

B.

40°

C.

50°

D.

60°

**Question 8** (1.0 marks)

Which of the following statements is **not** an equivalent version of Euclid's fifth postulate?

A.

Two distinct intersecting lines cannot be parallel to the same line.

B.

For every line  $l$  and for every point  $T$  not lying on  $l$ , there exists a unique line  $m$  passing through  $T$  and parallel to  $l$ .

C.

If a straight line crossing two straight lines makes interior angles measuring less than two right angles on the same side, then the two lines, if extended indefinitely, will meet on that side on which the angles measure more than two right angles.

**D.**

If two parallel lines are cut by a transversal, then the alternate interior angles are equal and the corresponding angles are also equal.

**Question 9** (2.0 marks)

Which rational number is equal to the decimal  $0.34\overline{89}$ ?

**A.**

$$\frac{69}{180}$$

**B.**

$$\frac{87}{250}$$

**C.**

$$\frac{349}{1000}$$

**D.**

$$\frac{691}{1980}$$

**Question 10** (2.0 marks)

If in  $\triangle PQR$ ,  $\angle P = 70^\circ$  and  $\angle Q = 75^\circ$ , then which of the following relations is correct?

**A.**

$$PQ > QR > PR$$

**B.**

$$PQ > PR > QR$$

**C.**

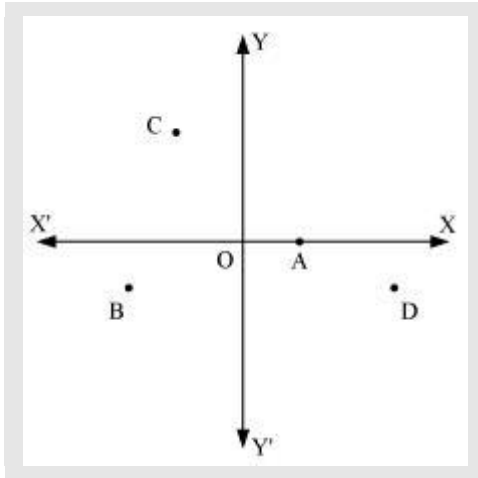
$$QR > PR > PQ$$

**D.**

$$PR > QR > PQ$$

**Question 11** (2.0 marks)

Use the following information to answer the next question.



Among the given points **A**, **B**, **C** and **D**; which point has negative abscissa and positive ordinate?

**A.**

**A**

**B.**

**B**

**C.**

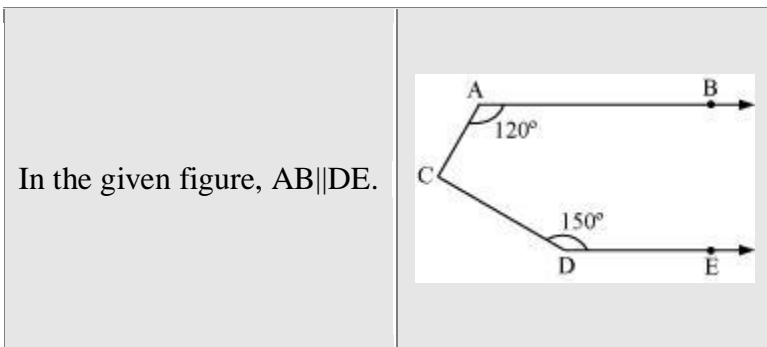
**C**

**D.**

**D**

**Question 12** (2.0 marks)

Use the following information to answer the next question.



What is the measure of  $\angle ACD$ ?

**A.**

$60^\circ$

**B.**

$90^\circ$

**C.**

$110^\circ$

**D.**

$120^\circ$

**Question 13** (2.0 marks)

Find a rational number which is equal to the expression,  $2.\overline{36} \div 1.\overline{5}$ .

**Question 14** (2.0 marks)

Simplify the expression  $\left(\left(\sqrt[3]{3}\right)^{\sqrt[3]{3}}\right)^{\sqrt[3]{9}}$ .

**Question 15** (2.0 marks)

The polynomial  $p(x) = x^3 + ax^2 - 11x - 12$  is exactly divisible by  $(x + 1)$ . Find the value of  $a$ .

**Question 16** (2.0 marks)

If  $(x - 1)$  is a factor of  $p(x) = kx^2 + (2k + 1)x - 13$ , then find the value of  $k$ . Factorise  $p(x)$ .

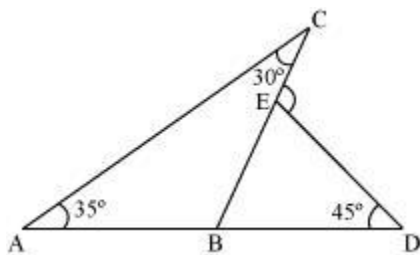
**Question 17** (2.0 marks)

Two polynomials,  $x^3 - 5x^2 + ax - 1$  and  $2x^3 + x^2 - (a + 1)x + 1$ , when divided by

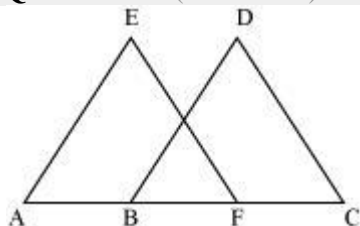
$(x - 1)$  gives remainder  $k_1$  and  $k_2$ . If  $2k_1 + k_2 = 2$ , then find the value of  $a$ .

**Question 18** (2.0 marks)

What is the measure of  $\angle CED$  in the given figure?



**Question 19** (2.0 marks)



In the given figure,  $AB = CF$ ,  $EF = BD$  and  $\angle EFC = \angle ABD$ . Prove that  $\triangle AFE \cong \triangle CBD$ .

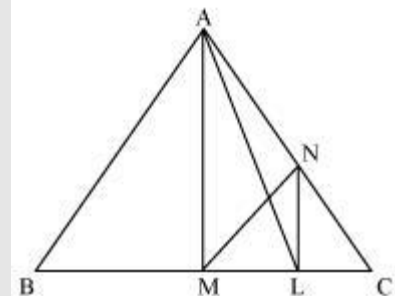
**Question 20** (3.0 marks)

Divide  $\left(x^3 - \frac{15}{2}x^2 + 29x - 6\right)$  by  $(x - 2)$ .

**Question 21** (3.0 marks)

Use the following information to answer the next question.

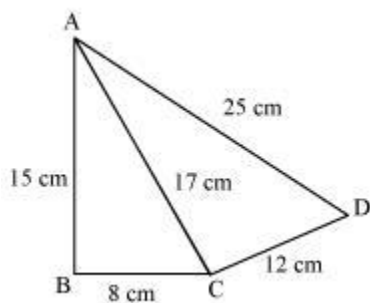
In the given figure, MN is the median of  $\triangle AMC$  with respect to AC and area  $(\triangle BMN) = \text{area}(\triangle ABL)$ .



Find the value of AM: NL with respect to the given figure.

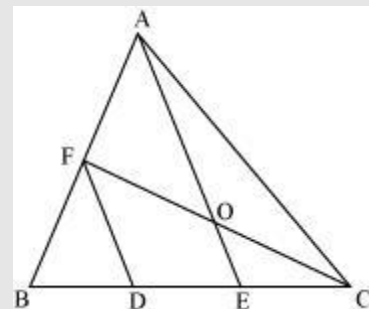
**Question 22** (3.0 marks)

Find the area of the given quadrilateral ABCD.

**Question 23** (3.0 marks)

Use the following information to answer the next question.

The given figure represents  $\triangle ABC$ . F is the mid-point of AB. From the vertex A, a line is drawn parallel to DF, intersecting BC at E.



If  $AE = 12$  cm and  $BE:EC = 2:1$ , then what is the length of OA?

**Question 24** (3.0 marks)

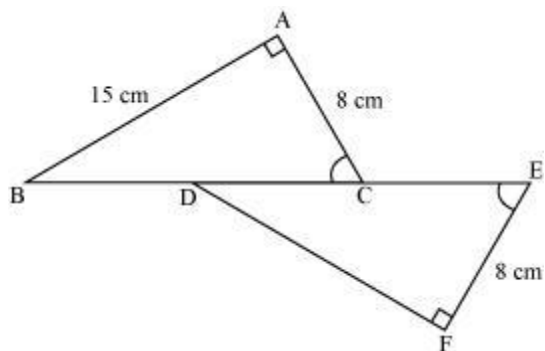
If  $\frac{1}{\sqrt{7}+\sqrt{6}} + \frac{1}{2\sqrt{2}+\sqrt{7}} + \frac{1}{3+2\sqrt{2}} = a+b\sqrt{6}$ , then find the value of  $(a-2b)^2$ .

**Question 25** (3.0 marks)

For three variables  $a$ ,  $b$ , and  $c$ , if  $a + b + c = 10$ ,  $a^2 + b^2 + c^2 = 38$ , and  $abc = 30$ , then find the value of  $a^3 + b^3 + c^3$ .

**Question 26** (3.0 marks)

In the given figure,  $\angle ACB = \angle FED$  and  $BE = 25$  cm. Find the length of  $DC$ ?

**Question 27** (3.0 marks)

Simplify.

$$\sqrt[5]{4\sqrt{(2^4)^3}} - 3\sqrt[5]{8} + 4\sqrt[4]{\sqrt[5]{2^{12}}}$$

**Question 28** (3.0 marks)

Determine whether the following sets of points form the vertices of a triangle.

(a)  $(-7, 0)$ ,  $(1, 4)$ , and  $(3, 5)$

(b)  $(-2, 4)$ ,  $(2, -4)$ , and  $(6, 3)$

**Question 29** (3.0 marks)

For a given line segment, use Euclidian Geometry to prove that a rhombus can be constructed having the line segment as its diagonal such that each side of the rhombus equals the length of the line segment.

**Question 30** (4.0 marks)

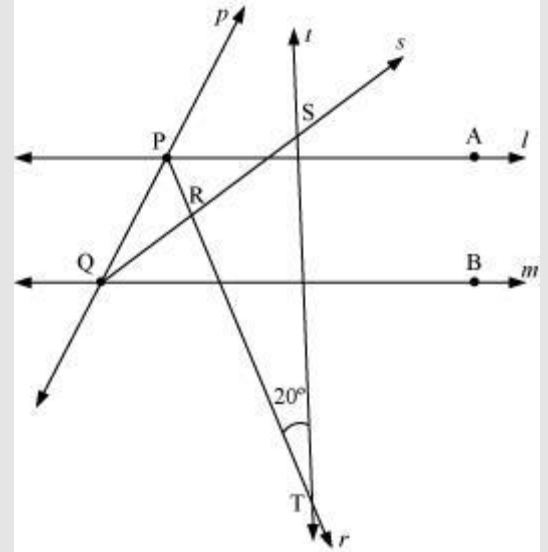
Simplify.

$$\frac{(a-b)^2}{(b-c)(c-a)} + \frac{(b-c)^2}{(c-a)(a-b)} + \frac{(c-a)^2}{(a-b)(b-c)}$$

**Question 31** (4.0 marks)

Use the following information to answer the next question.

In the given figure, the lines  $l$  and  $m$  are parallel. Lines  $r$  and  $s$  are the bisectors of  $\angle APQ$  and  $\angle BQP$  respectively.

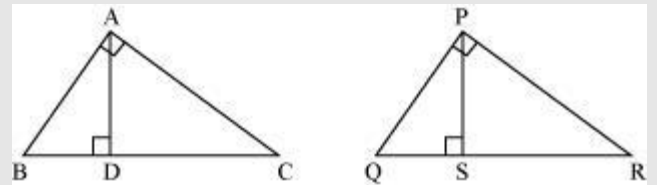


Find the measure of  $\angle QST$ ?

**Question 32** (4.0 marks)

Use the following information to answer the next question.

The given figure shows two triangles  $ABC$  and  $PQR$ , where  $\angle BAC = \angle QPR = 90^\circ$ .  $D$  and  $S$  are points on the side  $BC$  and  $QR$  respectively such that  $AD \perp BC$  and  $PS \perp QR$ .



If  $AB = PQ = 6$  cm,  $AC = 8$  cm,  $AD = 4.8$  cm, and  $QS = 3.6$  cm, then what is the perimeter of  $\triangle PQR$ ?

**Question 33** (4.0 marks)

Factorise the polynomial  $p(x) = x^3 + 13x^2 + 32x + 20$

**Question 34** (4.0 marks)

Prove that the sum of the angles of a triangle is  $180^\circ$ . Deduce that if a side of a triangle is produced, then the exterior angle so formed is equal to the sum of the two interior opposite angles.

Using this, answer the following question:

In the given figure,  $BE \parallel CD$  and  $CE \perp AD$ . What is the measure of  $\angle PAD$ ?

