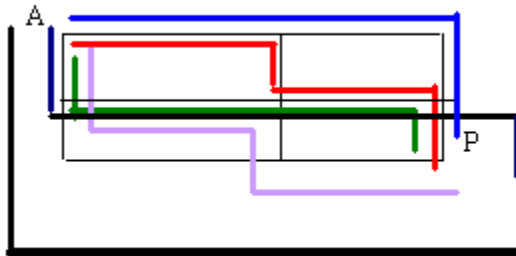


solution

Maths CAT Nov., 2008

1. (A) Let us consider the following:
 $(a + b + c)^1 = a + b + c \rightarrow 3 \text{ terms } (1 + 2)$
 $(a + b + c)^2 = a^2 + b^2 + c^2 + 2ab + 2bc + 2ca \rightarrow 6 \text{ terms } (1 + 2 + 3)$
 Similarly
 $(a + b + c)^3$ when expanded has 10 terms i.e. $(1 + 2 + 3 + 4)$
 Hence in general
 $(a + b + c)^n = (1 + 2 + 3 + \dots + (n + 1))$
 In this case $n = 20$
 \Rightarrow Number of terms $= (1 + 2 + 3 + \dots + 21)$
 $= \frac{21 \times 22}{2}$
 $= 231$
2. (D) :



Consider the streets from A to the corner of the plot X. The shortest ways to reach from A are:-

As shown by coloured lines there are six short routes from A to the park P.

The shortest route to cross the park 'P' is along the diagonal of park because diagonal is always lesser than some of adjacent sides.

Similarly it can be shown that there are 15 ways to travel from Y to B with minimum distance travelled.

Hence total numbers of ways $= 6 \times 15 = 90$ ways

3. (A):
 As explained earlier, there are 90 possible shortest paths in travelling from A to B
 In travelling from B to C there are 13 possible paths with minimum distance. Hence
 total number of paths in travelling from A to C via B $= 13 \times 90 = 1170$

4. (E): The required integers are multiples of 9 and less than 500, because digit sum $= 9$ is possible only in multiples of 9.

5. (C): Numbers written on the board are

1, 2, 3, 4, ...40

Sum of the numbers written on board =
=820

Let two numbers a and b be removed and the new number $a + b - 1$ is added.

So the sum of the numbers left on the board will be

$$820 - (a + b) + (a + b - 1) = 819$$

⇒ After every operation the sum of the numbers is reduced by 1 and also the number of integers reduces by one.

After 39 operations only one number will be left and it will be equal to

$$820 - 39 = 781$$

6. (D)

7. (D)

8. (B): Let us start with reverse calculation and assume the least possible qty of rice, i.e. 0.5 kg

The last customer buys 0.5+0.5 kg of rice.

Before the last customer the shopkeeper had $0.5 + 0.5 + 0.5 = 1.5$ kg of rice.

Before the second customer the shopkeeper had $1.5 + 1.5 + 0.5 = 3.5$ kg of rice

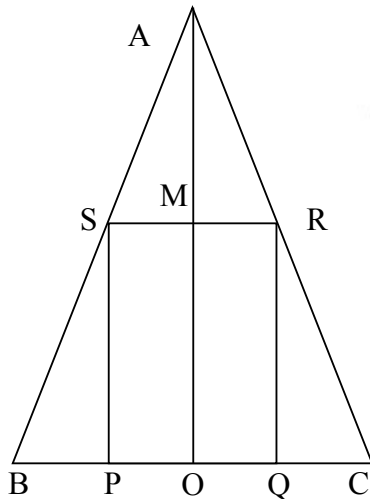
So initially the shopkeeper had $3.5 \times 2 = 7$ kg of rice.

First customer gets $7/2 + 0.5 = 4$ kg

Second customer gets $3/2 + 0.5 = 2$ kg

Third customer gets $1/2 + 0.5 = 1$ kg

9. (A)



Let PQRS be the cross section of the cylinder placed in the cone ABC

Radius of the cone = 4 cm = BO = CO

Height of the cone = 10 cm = AO

Let R be the radius and H be the height of the cylinder.

Consider $\triangle ASR$ and $\triangle ABC$.

These two are similar triangles.

$$SR = 2R,$$

$$AM = 10 - H,$$

$$BC = 8 \text{ cm},$$

$$AO = 10 \text{ cm}$$

$$\frac{AM}{AO} = \frac{SR}{BC}$$

$$\Rightarrow \frac{10 - H}{10} = \frac{2R}{8}$$

$$\Rightarrow \frac{10 - H}{5} = \frac{R}{2}$$

$$\Rightarrow 20 - 2H = 5R$$

$$\Rightarrow 2H = 20 - 5R$$

$$\Rightarrow H = 10 - 2.5R$$

Total surface area of the cylinder

$$S = 2\pi R^2 + 2\pi RH$$

$$= 2\pi R(R + H)$$

$$= 2\pi R(R + 10 - 2.5R)$$

$$= 2\pi R(10 - 1.5R)$$

$$= 2\pi (10R - 1.5R^2)$$

For the area to be maximum

$$\frac{dS}{dR} \text{ must be zero.}$$

$$\frac{dS}{dR} = 2\pi (10 - 1.5 \times 2R) = 0$$

$$\Rightarrow 10 - 3R = 0 \Rightarrow R = \frac{10}{3} \text{ cm}$$

$$\Rightarrow H = 10 - \frac{2.5 \times 10}{3} = \frac{30 - 25}{3} = \frac{5}{3}$$

Maximum surface area

$$S_{\max} = 2\pi \times \frac{10}{3} \left(\frac{10}{3} + \frac{5}{3} \right) = 2\pi \times \frac{10}{3} \times 5 = \frac{100\pi}{3} \text{ sqcm}$$

10. (C)

11. (A): Solving through option.

Option (A) gives $m = 2$ or 3



If $m = 2$ then we get:

$$2^1 = 2$$

$$3^2 = 9$$

$$4^3 = 64$$

$2+9+64=75$ which is not a perfect square.

Let us check for $m = 3$

$$3^1 = 3$$

$$4^2 = 16$$

$$5^3 = 125$$

$$125 + 16 + 3 = 144$$

$$\sqrt{144} = 12 = 3 + 4 + 5$$

12. (D) : The required integers are four digit numbers beginning from 1000 and less than 4000.

The first digit of such integers can be 1, 2, or 3 because only one number 4000 can be formed using first digit as 4.

With the first digit as 1, 2 or 3, the remaining three digits can any of the five digits i.e. 0, 1, 2, 3, 4.

Numbers of integers that can be formed below 4000 (above 999)

$$3 \times 5 \times 5 \times 5 = 375$$

$$\text{Total number of required integers} = 375 + 1 = 376$$

13. (A): The first term is

$$\sqrt{1 + \frac{1}{1^2} + \frac{1}{2^2}} = \sqrt{1 + \frac{1}{1} + \frac{1}{4}} = \sqrt{2 + \frac{1}{4}} = \sqrt{\frac{9}{4}} = \frac{3}{2} = 2 - \frac{1}{2}$$

Second Term

$$\sqrt{1 + \frac{1}{4} + \frac{1}{9}} = \sqrt{\frac{36 + 9 + 4}{36}} = \sqrt{\frac{49}{36}} = \frac{7}{6}$$

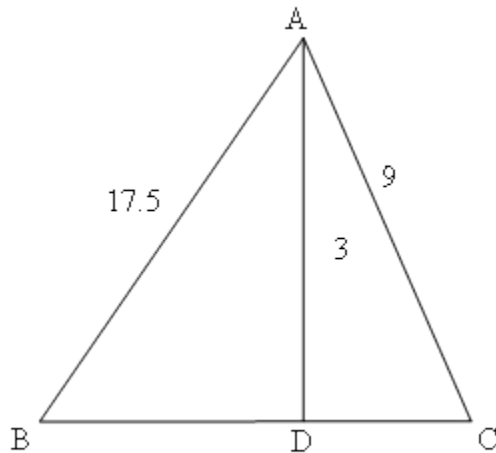
Sum of the two terms

$$\frac{3}{2} + \frac{7}{6} = \frac{16}{6} = \frac{8}{3} = 3 - \frac{1}{3}$$

Continuing the process we get the required sum

$$2008 - \frac{1}{2008}$$

14. (E)



Here
 BC=a
 AC=b=9cm
 AB=c=17.5 cm
 Area of the triangle



$$\text{Area of a triangle} = \frac{1}{2} \times a \times 3$$

$$\text{Area of triangle} = \frac{a \times b \times c}{4R}$$

$$\Rightarrow = \frac{a \times b \times c}{4R} = \frac{1}{2} \times a \times 3$$

$$\text{Now, } R = \frac{a \times b \times c}{4} \times \frac{2}{3a} = \frac{b \times c}{6} = \frac{17.5 \times 9}{6} = 26.25 \text{ cm}$$

15. (B)

16. (C): Let us consider

$$7^1 = 7, 7^2 = 49, 7^3 = 343,$$

$$7^4 = 2401, 7^5 = 16807,$$

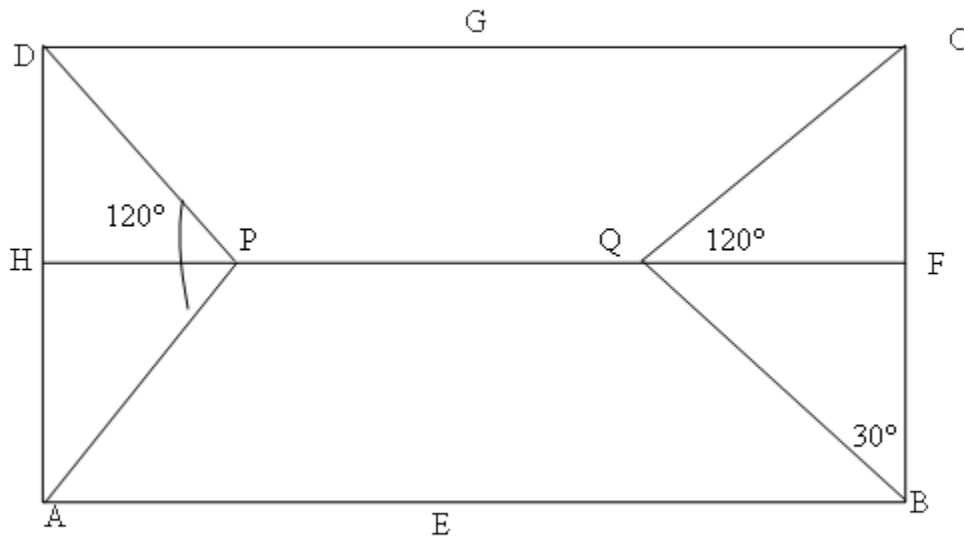
$$7^6 = 117649, 7^7 = 823543,$$

$$7^8 = 5764801,$$

$$7^9 = 40353607, \dots$$

We observe that last two digits are repeated after every 4th powers, since 2008 is a multiple of four, the last two digits will be 01.

17. (E)



Let the side of the square be x . www.excellup.com

In $\triangle BQF$

$$\tan 30^\circ = \frac{QF}{BF} = \frac{QF}{0.5x}$$

$$\Rightarrow \frac{1}{\sqrt{3}} = \frac{2QF}{x}$$

$$\Rightarrow QF = \frac{x}{2\sqrt{3}}$$

$$\text{Area of } \triangle BQF = \frac{1}{2} \times \frac{x}{2} \times \frac{x}{2\sqrt{3}}$$

$$\text{Area of four such triangles} = 4 \times \frac{x^2}{8\sqrt{3}} = \frac{x^2}{2\sqrt{3}}$$

$$\text{Area of the Square } ABCD = x^2$$

$$\text{So, area of } ABQCPD = x^2 - \frac{x^2}{2\sqrt{3}} = \frac{x^2(2\sqrt{3} - 1)}{2\sqrt{3}}$$

$$\text{Required Ratio} = \frac{x^2(2\sqrt{3} - 1)}{2\sqrt{3}} \times \frac{2\sqrt{3}}{x^2} = 2\sqrt{3} - 1$$

18. (B)

19. (B): It is given that

$$f(5) = -3f(2)$$

$$a \times 5^2 + b \times 5 + c = -3(a \times 2^2 + b \times 2 + c)$$

$$\Rightarrow 25a + 5b + c = 12a - 6b - 3c$$

$$\Rightarrow 37a + 11b + 4c = 0 \dots\dots\dots (1)$$

Also since b is the root of the $f(x) = 0$

$$9a + 3b + c = 0 \dots\dots\dots (2)$$

From equation (2) we get

$$36a + 12b + 4c = 0 \dots\dots\dots (3)$$

From equations (1) & (3) we get

$$37a + 11b + 4c - (36a + 12b + 4c) = a - b = 0$$

$$\Rightarrow a = b$$

So, from equation (2) it can be proved

$$9a + 3b = c$$

$$\Rightarrow 9a + 3a = c$$

$$\Rightarrow a = \frac{c}{12}$$

Putting these values in the given equation we get

$$ax^2 + bx + c = 0$$

$$\Rightarrow ax^2 + ax + 12a = 0$$

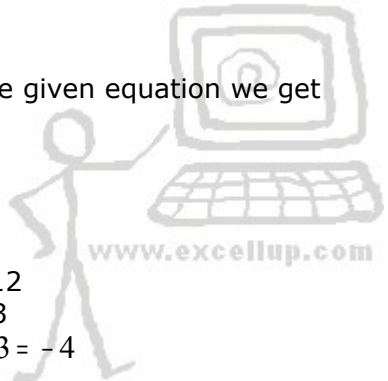
$$\Rightarrow x^2 + x + 12 = 0$$

$$\text{Sum of the roots} = -1$$

$$\text{Products of the roots} = -12$$

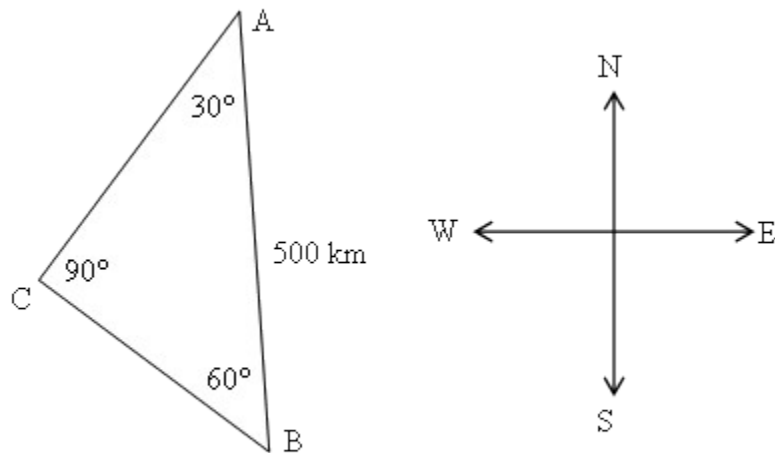
Since one of the roots is 3

$$\text{So, another root} = -12 \div 3 = -4$$



20. (E)

21. (B):



The location of various stations is as shown in the above figure.

It is observed that ABC is a right angled at C equal to 90° and $AB = 500$ km;
 $AC = 500 \sin 60^\circ$

$$= 500 \times \frac{\sqrt{3}}{2} = 250\sqrt{3}$$

$$BC = 250 \text{ m}$$

The train leaves B at 8:00 am and travels towards C at the speed of 50 km/hr.
 Time taken by the train to reach C

$$\frac{250}{50} = 5 \text{ hrs} =$$

The train reaches C at 1.00 pm.

Rahim must reach station C at 12.45 pm.
 Time taken by Rahim to travel ($AC = 250\sqrt{3}$ km)
 At the speed of 70 km/hr.
 $= \frac{250}{70} \times \sqrt{3}$
 $= 6 \text{ hrs. } 11 \text{ mts.}$

$$\Rightarrow \text{He must leave station A at } (12.45 - 6.11) \\ = 6.34 \text{ or } 6.30 \text{ am}$$

22. (E)

23. (C): When there are three horses between White and Red, the White and Red will be at first and fifth position

Case I White horse at first position Winning amount
 $= 4 \times 2000$

Data Interpretation And Reasoning CAT Nov., 2008

1. (A): Percentage of total revenue by 2010 for
India $\rightarrow 9 \times 3 = 27\%$

Sweden $\rightarrow 18 \times 2 = 36\%$

Let the total revenue by 2010 in Sweden be x .

Total revenue by 2010 in India = $2x$

Let the volume of data transfer be v each in India and Sweden

ARDT in Sweden

= \$6 (no change) in 2010.

\Rightarrow For Sweden

$$6 \times v = 0.36 \times x \quad \dots\dots(1)$$

For India

$$\text{ARDT} \times v = 0.27 \times 2x \quad \dots\dots(2)$$

Dividing (2) by (1)

$$\frac{\text{ARDT}}{6} = \frac{0.27 \times 2}{0.36}$$

\Rightarrow ARDT

$$= \frac{3}{4} \times 2 \times 6 = \$9$$

\Rightarrow ARDT for India in 2010

$$= \text{US\$}9$$

Increase in ARDT for India

$$= 9 - 1 = \text{US\$}8$$

Percentage increase

$$= \frac{8}{1} \times 100 = 800\%$$

2. (E): Let the volume of data transfer in India and Singapore be v each

ARDT for India = US\$1

ARDT for Singapore = US\$9

Revenue for India from Data transfer = $1 \times v = v = 9\%$ of total revenue

Total revenue for India = $100/9 \times v = 11.1v$

Revenue for Singapore from Data transfer = $9 \times 5 = 9v$

Total revenue for Singapore = $100/20.5 \times 9 = 43.9$

\Rightarrow Total revenue in Singapore is nearly 4 times the total revenue in India

3. (D): Total revenue

$$= \frac{\text{ARDT} \times \text{Volume} \times 100}{\dots}$$

Percentage of revenue from data transfer

As the total revenue and volume is same for the pair of countries, the ratio

$\frac{\text{ARDT}}{\dots}$

Percentage

Should be same

Such countries should nearly lie on a straight line drawn from the origin. Option 4 satisfies this condition.

4. (C): In order to get a call from a college Charlie should get the minimum aggregate equal to the cut off marks. He can obtain maximum 50 marks in any subject. Assuming that he gets maximum marks in three sections, then the maximum marks in remaining section should be as follows:

- College 1 $\rightarrow 176 - 150 = 26$
 College 2 $\rightarrow 175 - 150 = 25$
 College 3 $\rightarrow 171 - 150 = 21$
 College 4 $\rightarrow 178 - 150 = 28$
 College 5 $\rightarrow 180 - 150 = 30$
 College 6 $\rightarrow 176 - 150 = 26$

So if he obtains a minimum of 21, he gets call only from college 3. But it is given that he got calls from two colleges, Hence, he should get a minimum of 25 marks to get calls from college 2 and college 3 as he would get above cut off marks in other sections.

5. (B): As she got calls from all colleges, she should have got marks in each in section, which makes her eligible for all colleges as below:

| | |
|---------------------|-----|
| Section A | 45 |
| Section B | 45 |
| Section C | 46 |
| Section D | 45 |
| Total minimum marks | 181 |

6. (C)

7. (C) Average gross pay of HR Deptt.

$$= 5000 + 70\% \text{ of } 5000$$

$$= \text{Rs. } 8500$$

Present pay of the person in Marketing Deptt.

$$= 8000 + 80\% \text{ of } 8000$$

$$= 8000 + 6400$$

$$= \text{Rs. } 14,400$$

As the person is transferred from a Deptt. of lower average age (Marketing) to a department of higher average age he will get additional 10%

New allowance = $6400 + 10\% \text{ of } 8000$

$$= \text{Rs. } 7200$$

Gross pay after transfer

$$= 8000 + 7200 = 15200$$

Total pay of HR Deptt after transfer of the person = $8500 \times 5 + 15200$

$$\text{Average pay} = \frac{8500 \times 5 + 15200}{6}$$

$$= \text{Rs. } 9617$$

Percentage change = $\frac{9617 - 8500}{8500} \times 100$

$$= 13.14\%$$

8. (C): $M_1 \leftrightarrow F, M_2 \rightarrow HR$

Let M_1 be the age of person transferred from Marketing to Finance and M_2 be the age of person transferred from Marketing to HR and let F be the age of persons transferred from Finance.

For Marketing:

$$\frac{30 \times 35 - M_1 - M_2 + F}{29}$$

= 35 (No change in average age)

$$\Rightarrow M_1 + M_2 - F = 35 \quad \dots (1)$$

For Finance Deptt.

$$20 \times 30 + M_1 - F$$

$$31 \times 20$$

$$\Rightarrow M_1 - F = 20 \quad \dots (2)$$

From (1) and (2) we get

$$M_2 = 15$$

New average age of HR Department

$$= \frac{45 \times 5 + 15}{6}$$

$$= \frac{225 + 15}{6} = 40 \text{ years}$$

9. (B): Total present basic pay of HR Deptt.

$$= 5 \times 5000$$

$$= \text{Rs. } 25000$$

New total basic pay

$$= 25000 + 2 \times 6000 + 1 \times 8000$$

$$= 25000 + 12000 + 8000$$

$$= 45000$$

Total new employees in HR Department

$$= 5 + 2 + 1 = 8$$

Average basis pay

$$= \frac{45000}{8} = \text{Rs. } 5625$$

Percentage change in basic pay

$$= \frac{5625 - 5000}{5000} \times 100$$

$$= 12.5\%$$

Qs. 10 - 13

From the given conditions we can make following table:

| Stage I | Won | Lost |
|---------|-----|------|
| | A | D |
| | D | C |
| | D | F |
| | B | E |
| | E | C |
| | E | F |

Since D and E have played 3 matches each, they are not involved in any other match. One team has won all the matches, it has to be team A as teams B, C, D, E and F have lost one or more matches.

Now since A has won all the matches each, A won matches against B and C as F did not play against A. So the balance three matches can be represented as

| Won | Lost |
|-----|------|
| A | B |
| A | C |
| B | F |

(__ two teams C and F lost all the matches)

So for stage one

| Team | Won | Lost |
|------|-----|------|
| A | 3 | - |
| B | 2 | 1 |
| C | - | 3 |

| | | |
|---|---|---|
| D | 2 | 1 |
| E | 2 | 1 |
| F | - | 3 |

Stage II

A lost both the matches and has already played against B, C & D.

Out of C and F one team won both matches and lost both matches. One more team lost both matches, it has to be team D

| | |
|-----|------|
| Won | Lost |
| E | A |
| F | A |
| F | C |
| B | C |
| B | D |
| E | D |

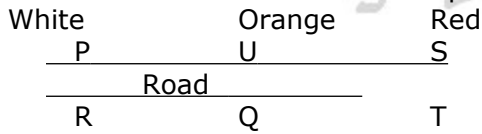
Combining the result of two stages, we get:

| Team | Stage I | | Stage II | | Total | |
|------|---------|---|----------|---|-------|---|
| | W | L | W | L | W | L |
| A | 3 | - | - | 2 | 3 | 2 |
| B | 2 | 1 | 2 | - | 4 | 1 |
| C | - | 3 | - | 2 | - | 5 |
| D | 2 | 1 | - | 2 | 2 | 3 |
| E | 2 | 1 | 2 | - | 4 | 1 |
| F | - | 3 | 2 | - | 2 | 3 |

- 10. (E): Teams D and F have won exactly two matches each
- 11. (E): Team B and E have most win i.e. 4 each
- 12. (B): E and F defeated the leader of stage I i.e. team A
- 13. (D): B, E, and F won both the matches in stage II.

Qs. 14- 16

The location of the houses as per given conditions are:



The order of height (decreasing) is

- 1 2 3 4 5 6

Tallest T ← S, Q → P R U Smallest

- 14. (E): the second Tallest house can be S or Q as their relative positions are not defined.
- 15. (D): Colour of the house diagonally opposite Yellow house is Red.
- 16. (B): The colour of the tallest house T is blue
- 17. (E)
- 18. (E)
- 19. (A)
- 20. (A)
- 21. (B)
- 22. (D):

| | | |
|------|--------------|-------------------|
| Year | Required Gap | Percentage Change |
|------|--------------|-------------------|

| | (APP.) | (Absolute) |
|------|--------|---|
| 2003 | 310 | - |
| 2004 | 340 | $\frac{340 - 310}{310} \times 100 = 9.67$ |
| 2005 | 320 | $\frac{320 - 340}{340} \times 100 = 5.8$ |
| 2006 | 275 | 14.06% |
| 2007 | 210 | 23.63% |
| 2008 | 185 | 11.9% |
| 2009 | 110 | 40.5% |
| 2010 | 100 | 9% |

23. (C): Growth rate of 2007
 $= \frac{500 - 375}{375} \times 100$
 $= 33.3\%$
 Growth rate of 2005
 $= \frac{270 - 180}{180} \times 100 = 50\%$

Percent change in growth
 Rate = $\frac{50 - 33.3}{50} \times 100$
 $= 35\%$

24. (A): Growth rate in 2007 over 2006
 $= \frac{500 - 375}{375} \times 100$
 $= 33.3\%$
 Subscription in 2008
 $= \frac{500 \times 4}{3} = \frac{2000}{3} = 667$
 Estimated subscription in 2008
 $= \text{US\$}610 \text{ Million Differences}$
 $= 667 - 610 = 57$



25. (A)

English Verbal Ability CAT Nov, 2008

1. Answer: (C) The correct usage will be run after him.
2. Answer: (B) 'Round the corner' is used as a verb so here the usage is incorrect.
3. Answer: (B) It should be buckled instead of broke into a buckle.
4. Answer: (E) It should be broke from the file.
5. Answer: (5) First words in all other options don't relate to the sentence.
6. Answer: (B) Observers is more suitable than scrutinizers or students. Out of options (B) and (D) agree is better as conceding is used in terms of accepting other's opinion with a sense of defeat.
7. Answer: (C) Endowment means an attribute of mind or body, so personal is the best choice. Within first few days of life there can be hardly an influence of education or pedagogy.
8. Answer: (E) Repulsion is more suitable as the sentence talks about conflict between old and new kind of world.
9. Answer: (D) Landed is used when someone comes in certain position so (B) is incorrect. (C) should have a colon before David, (D) is logically wrong as (E) suggests Levi Strauss to be the owner of the dry goods business. (E) became should be replaced by be.
10. Answer: (C) use of 'their' is incorrect in (B), 'concerns' should be replaced by 'unrest' in (C), (D) is not logically relating to the whole paragraph.
11. Answer: (D) 'million' should be replaced by 'millions' in (B) and 'have' should be replaced by 'has' in (E)
12. Answer: (E) 'you'd' should be replaced with 'you've' in (B). 'seem' should be replace by 'seemed' in (C). 'effort' should be in plural form.
13. Answer: (B) brooch is a type of ornaments, councilor is the member of a council, advise is used as noun, climactic has been derived from climax, flaring is used for spreading gradually as in bell-bottoms.
14. Answer: (C) currants are type of seedless raisins used in cookery. Exceptionable is synonymous with objectionable. Consenting is usually done under pressure while assenting is used in situation of more authority. Parliamentary boards are constituted for some special purpose so reporting to it is done under special circumstances which may not be part of routine responsibility of a minister. Sanguine means too much optimistic.
15. Answer: (B) the act of biting back indicates towards caustic. Cogent is used in case it is coming out of good presentation. Aversion is used for negative feeling. Coupe means a special compartment. Pealing is a loud, prolonged ringing of bells.

16. Answer: (A) diffusing is used for spreading, defuse means to lessen some danger. Baited is used for irritating someone. Horde means a mass of people. Interment is an act of entering a procession. Unsociable is akin to objectionable.

17. Answer: (A)

18. Answer: (C)

19. Answer: (E)

20. Answer: (A)

21. Answer: (A) The author has mentioned about too many people competing for fewer resources.

22. Answer: (D) Anthropogenic means caused by humans.

23. Answer: (C) '.....there was no useful unoccupied land in the vicinity on which to begin anew'. This sentence indicates towards option (C).

24. Answer: (C) The first paragraph indicates towards option (C).

25. Answer: (C) Climate change has not been mentioned in the passage.

26. Answer: (C) Contrary to the concepts of science the concepts of arts don't come out of planned exchange of ideas.

27. Answer: (E) Option 'D' can be easily eliminated as it is not pointing towards arts. The passage doesn't talk about uselessness so 'A' can be eliminated. The author talks about surrealism as a movement which has had long lasting impact, so option 'E' is the best choice.

28. Answer: (A) The third sentence of first paragraph indicates towards this option.

29. Answer: (C) The statement that a particular movement may affect the thought process of totally unrelated generation indicates towards this option.

30. Answer: (E) The last sentence talks about how a creative person moulds past ideas to suit his present needs.

31. Answer: (C) The author is perplexed by this logic given by elders so this cannot be concluded from the passage.

32. Answer: (E) Parvenus means a person who has newly acquired wealth.

33. Answer: (D) The statement that the author was fascinated by seeing kids going with two ice-creams indicates towards this option.

34. Answer: (B) The last sentence indicates about change in the value system. So what was immoral in the past may be seen as moral in the present.

35. Answer: (A) The fact that the author smells something pedagogical indicates towards this option.

36. Answer: (E) This is the conclusion author derives after brief introduction.

37. Answer: (B) in option A the kitten is still learning. Option C and D are about acquired skills.

38. Answer: (C) The last sentence of paragraph 1 indicates towards this option. Other animals also use symbols and voice modulation to communicate, so the author doesnot view ability to communicate as unique to human beings.

39. Answer: (B) The author states that language is the biological birthright and cannot be taught.

40. Answer: (C) The introductory sentence indicates towards this option. Moreover, the whole argument is made to strengthen this initial idea.

