



Bebras Indonesia

Computational Thinking & Bebras Indonesia

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Software Architecture Conference 2018



Latar Belakang

- Di abad ke-21, di mana teknologi terutama teknologi informasi dan “komputer” hadir di mana-mana, selain literasi digital, penguasaan **keilmuan “informatika”** diperlukan, agar bangsa Indonesia tidak hanya menjadi pemakai teknologi, tetapi dapat ikut memajukan bangsa dan negara Indonesia lewat hasil karya “digital” pendukung penyelesaian persoalan kehidupan yang semakin kompleks dan membuat kehidupan semakin nyaman.

Top 10 skills

in 2020

1. Complex Problem Solving
2. Critical Thinking
3. Creativity
4. People Management
5. Coordinating with Others
6. Emotional Intelligence
7. Judgment and Decision Making
8. Service Orientation
9. Negotiation
10. Cognitive Flexibility



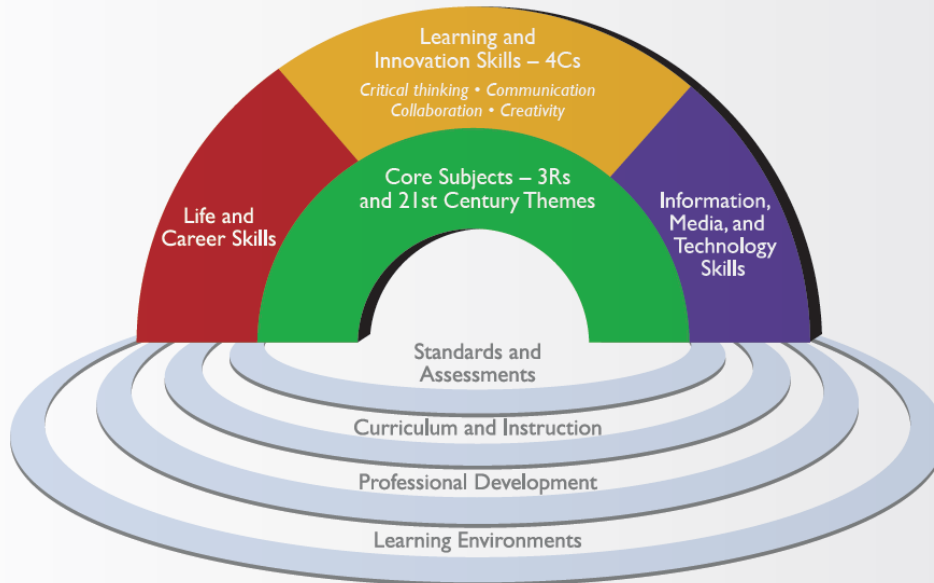
in 2015

1. Complex Problem Solving
2. Coordinating with Others
3. People Management
4. Critical Thinking
5. Negotiation
6. Quality Control
7. Service Orientation
8. Judgment and Decision Making
9. Active Listening
10. Creativity



Source: Future of Jobs Report, World Economic Forum

21st Century Student Outcomes and Support Systems



Four Cs of 21st century learning:
Collaboration.
Communication.
Critical thinking.
Creativity.

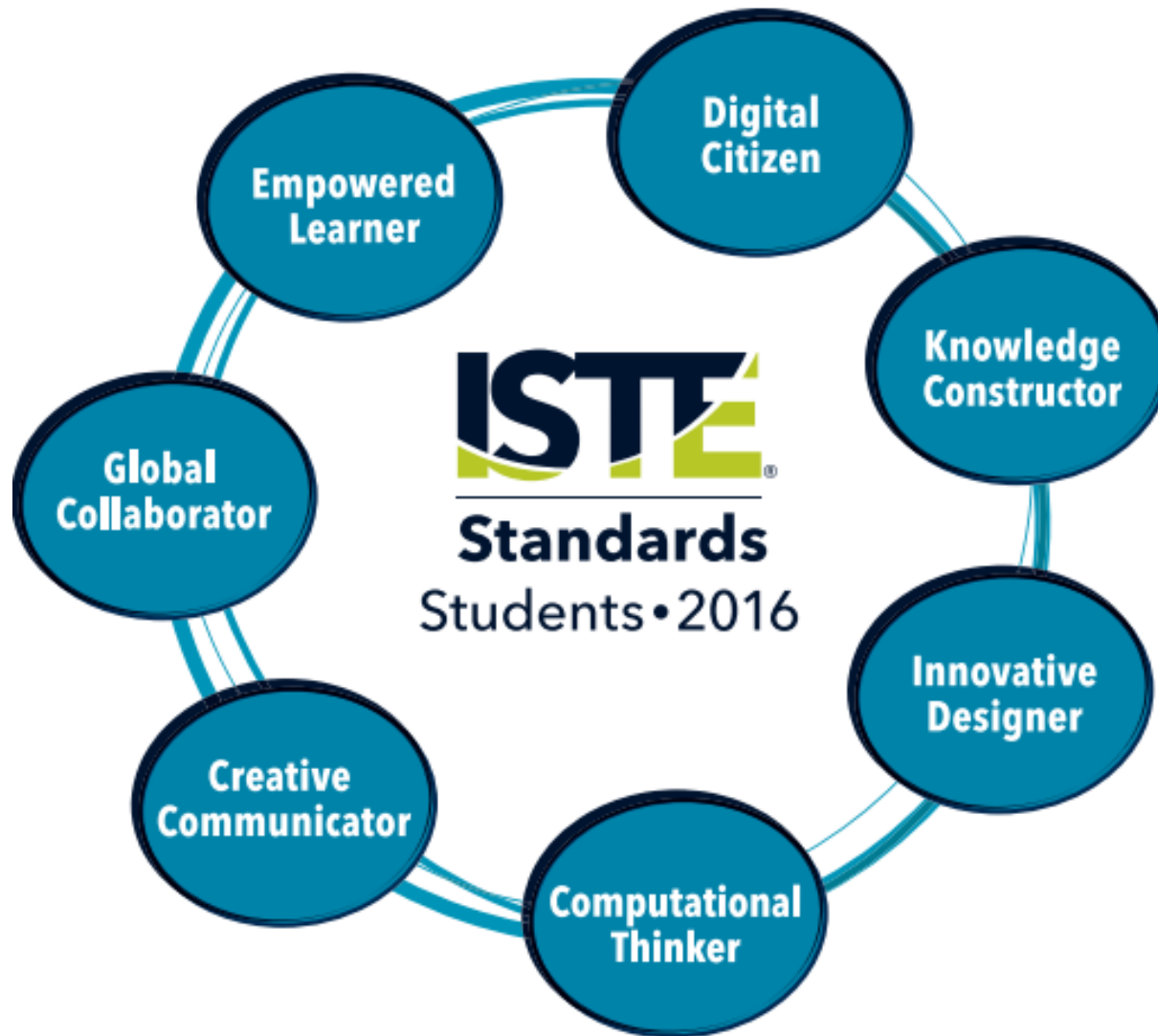
<http://www.p21.org/>



The 5th 'C' of 21st Century Skills? Try Computational Thinking (Not Coding)

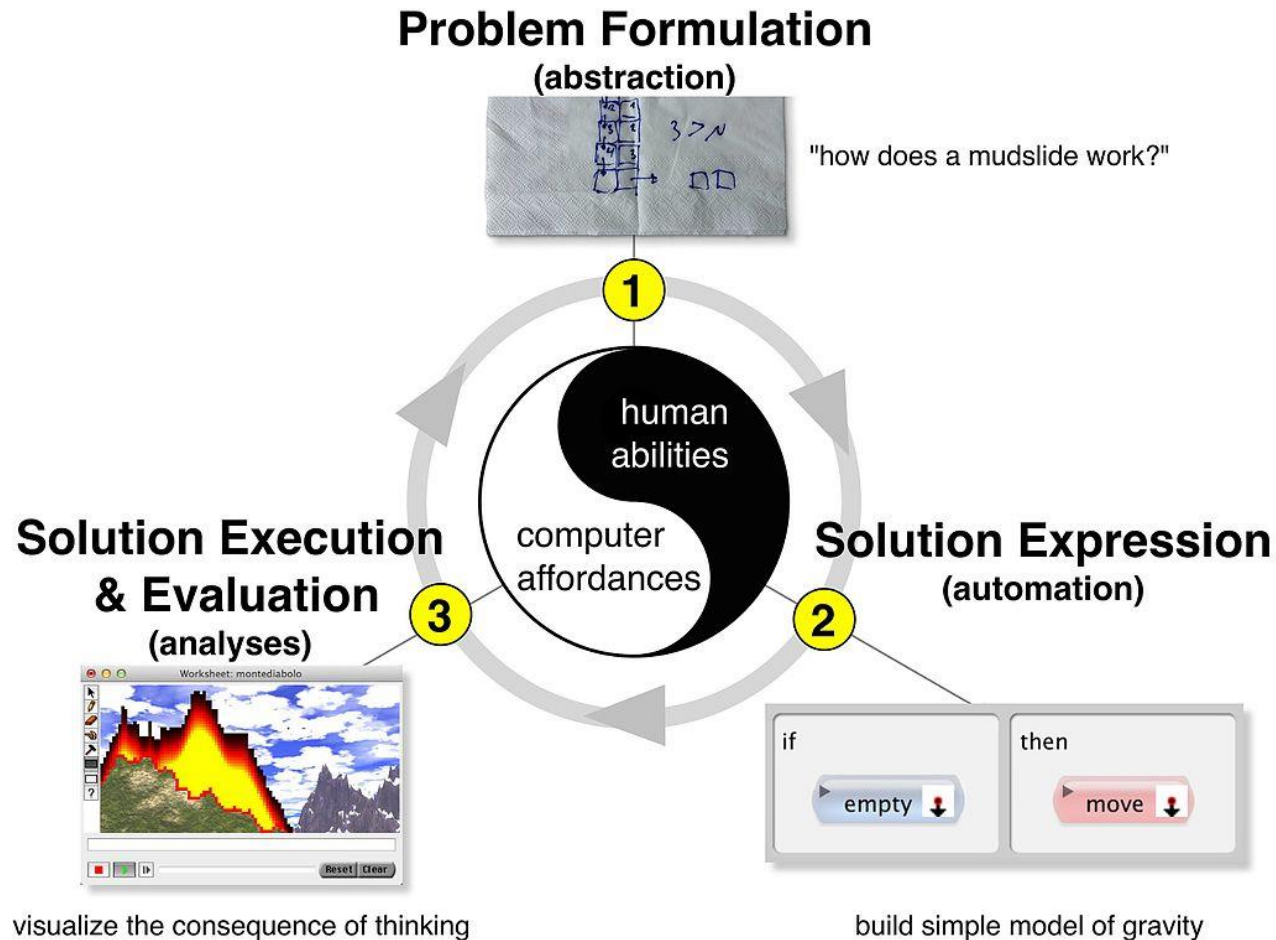
<https://www.edsurge.com/news/2018-02-25-the-5th-c-of-21st-century-skills-try-computational-thinking-not-coding>

<http://www.iste.org/standards/for-students>





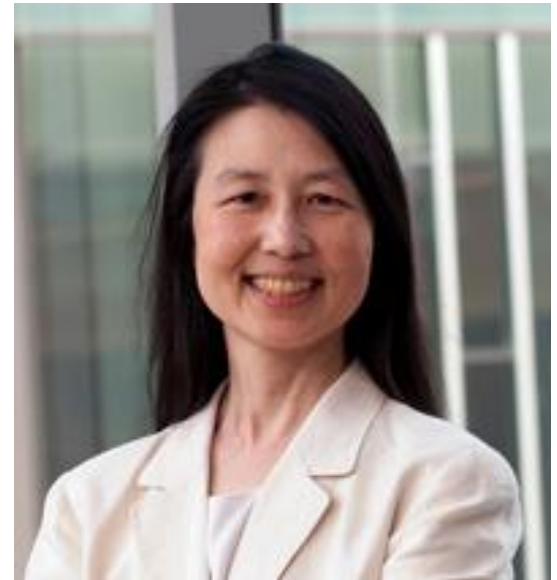
Computational Thinking



There are many problems that cannot be solved at all with computation;
their solutions will emerge only from social cooperation among groups
<https://www.americanscientist.org/article/computational-thinking-in-science>

Computational Thinking

- Originally used by Seymour Papert, MIT, in *Mindstorms: Children, computers, and powerful ideas*, Basic Books Inc. 1980.
- Popularized by Jeanette M. Wing (2006) *Computational Thinking. Communications of the ACM*, 49(3), 33-35.



Computational Thinking

"Computational Thinking is the thought processes involved in formulating problems and their solutions so that the solutions are represented in a form that can be effectively carried out by an information-processing agent."

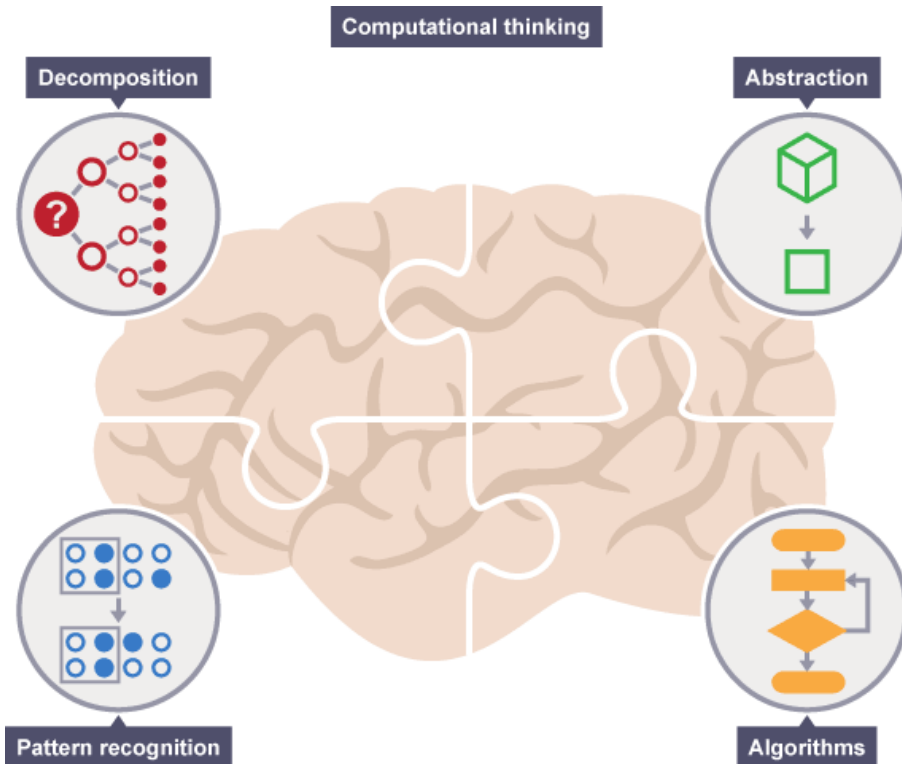
J. Cuny, L. Snyder, and J. M. Wing.
Demystifying Computational Thinking for
Non-Computer Scientists, 2010



Jeanette M. Wing
Carnegie Mellon
University

Computational Thinking

<http://www.bbc.co.uk/education/topics/z7tp34j>



Four key techniques
(cornerstones) to CT:

decomposition - breaking down a complex problem or system into smaller, more manageable parts

pattern recognition – looking for similarities among and within problems

abstraction – focusing on the important information only, ignoring irrelevant detail

algorithms - developing a step-by-step solution to the problem, or the rules to follow to solve the problem

Computational Thinking:

Operational definition for K-12 education

Computational thinking (CT) is a problem-solving process that includes (but is not limited to) the following characteristics:

- **Formulating** problems in a way that enables us to use a computer and other tools to help solve them
- Logically **organizing** and **analyzing** data
- **Representing** data through abstractions such as models and simulations
- **Automating** solutions through algorithmic thinking (a series of ordered steps)
- **Identifying, analyzing, and implementing** possible solutions with the goal of achieving the most efficient and effective combination of steps and resources
- **Generalizing** and **transferring** this problem solving process to a wide variety of problems

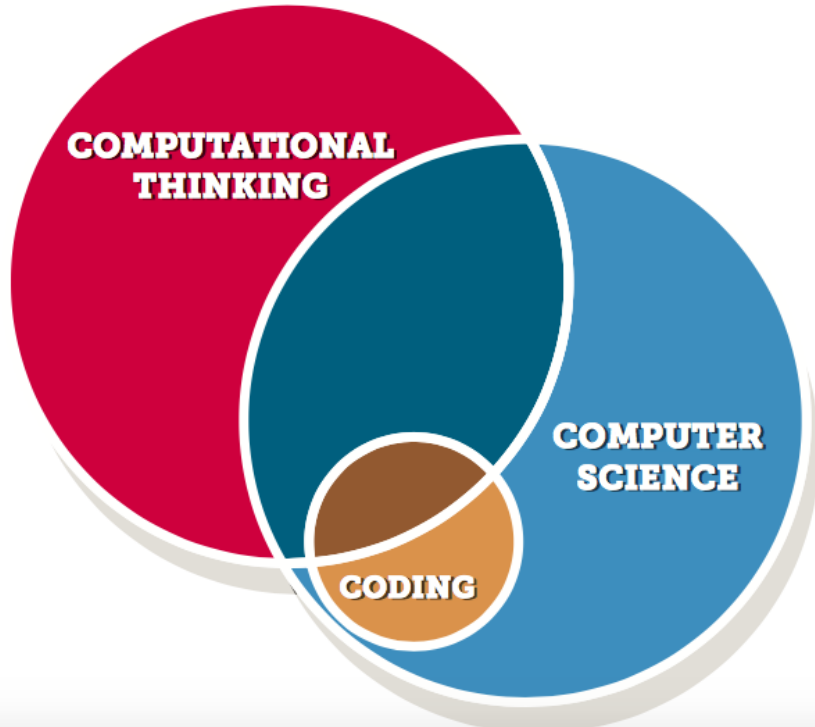
The skill required to tell a computer what to do
is programming.

The thought process behind programming
is computational thinking

Computational Thinking is both a skill to learn and
a way to learn – to create, discover, and make sense
of the world, often with computers as extensions
and reflections of our minds

<https://digitalpromise.org/wp-content/uploads/2017/12/dp-comp-thinking-v1r5.pdf>

The Relationship between Coding, Computer Science, and Computational Thinking



Coding is the practice of developing a set of instructions that a computer can understand and execute.

Computer science is “the study of computers and algorithmic processes, including their principles, their hardware and software designs, their applications, and their impact on society.”

Computational thinking is “a way of solving problems, designing systems, and understanding human behavior that draws on concepts fundamental to computer science... a fundamental skill for everyone, not just computer scientists.”

Coding ~ technical skill

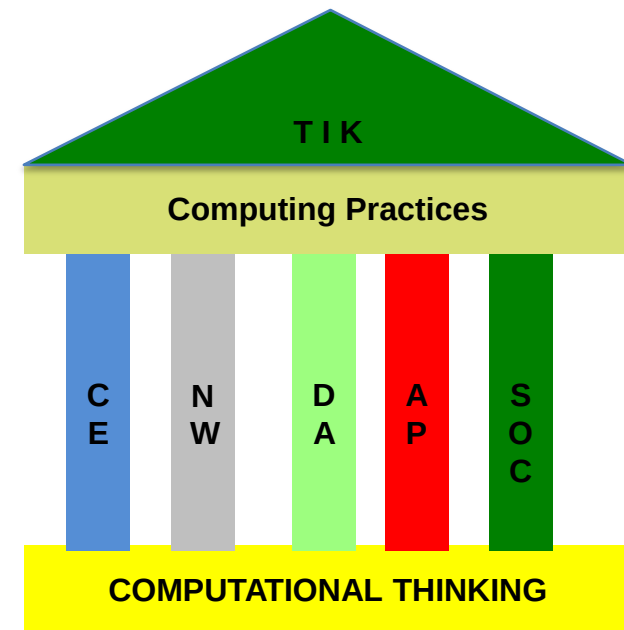
CS ~ academic discipline

CT ~ problem solving process central to CS

Kemampuan Informatika

Kurikulum Nasional K-12 Informatika

- **Berpikir**, yaitu berpikir komputasional (*computational thinking*) yang menjadi landasan dan prinsip pemecahan persoalan yang akan diselesaikan dengan bantuan sistem terkomputerisasi.
- **Berkarya dan terampil**, yaitu kemampuan dalam menggunakan dan menghasilkan produk TIK serta berkomunikasi dan berkolaborasi di dunia digital dengan memanfaatkan sarana TIK.
- **Berpengetahuan**, yaitu kemampuan tentang keilmuan informatika yang mencakup lima bidang pengetahuan yang merupakan pilar pengetahuan informatika yaitu Teknik Komputer, Jaringan Komputer/Internet, Analisis Data, Algoritma dan Pemrograman, dan Dampak Sosial Informatika.
- **Berkarakter**, yaitu berkemampuan dalam mendayagunakan teknologi untuk menunjang kehidupan dan berkomunikasi



Bagaimana Mengasah Computational Thinking ?

- Computational Thinking Perlu untuk mulai diperkenalkan sejak usia dini, dan dilatih terus menerus seiring perkembangan peserta didik.
- Caranya ?
 - Dengan latihan menyelesaikan persoalan dan diskusi dalam kehidupan sehari-hari [dipresentasikan lewat contoh-contoh soal Bebras]
 - Soal yang sama bisa diulang untuk SD, SMP, SMA dengan kompleksitas menaik

Dabar
Međunarodno takmičenje iz računarke i informatičke pismenosti

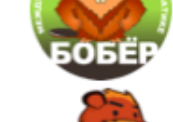


Bebras

International Challenge on Informatics and Computational Thinking



+/-50 countries, > 2.166.000 participants @2017



HRVATSKA
CROATIA



BEBRAS :: Kontes dalam CT



- **BEBRAS** (*Beaver*) – International Challenge on Informatics and Computational Thinking
- Renamed: earlier was International Contest on Informatics and Computer Fluency
- Established in 2004, Indonesia joined Bebras Community since 2016 (observer), 2017 (NBO)

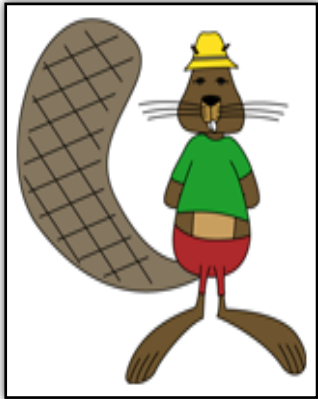
Shift: algorithmic thinking to computational thinking
informatics for informatics to informatics for all

- **International** website: <http://bebras.org>
- **Indonesian** website: <http://bebras.or.id>
- **Indonesian contest** environment: <http://olympia.id>

Bebras *Indonesia*

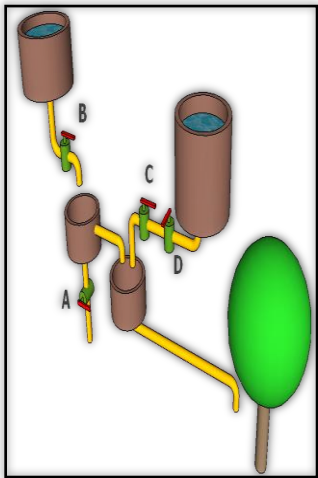


What is a Bebras task ?



<http://bebras.org/?q=goodtask>

- Merepresentasikan konsep-konsep informatika
- Dapat dengan mudah dimengerti
- Dijawab dalam waktu 3 menit
- Pendek, umumnya 1 layar
- Dapat dijawab di komputer tanpa menggunakan software lain maupun kertas dan pensil
- Menarik dan/atau lucu



Contoh Soal Bebras Algoritma, Struktur Data



Cacing dan Buah Apel

SIAGA (SD)
I-2017-SK-08

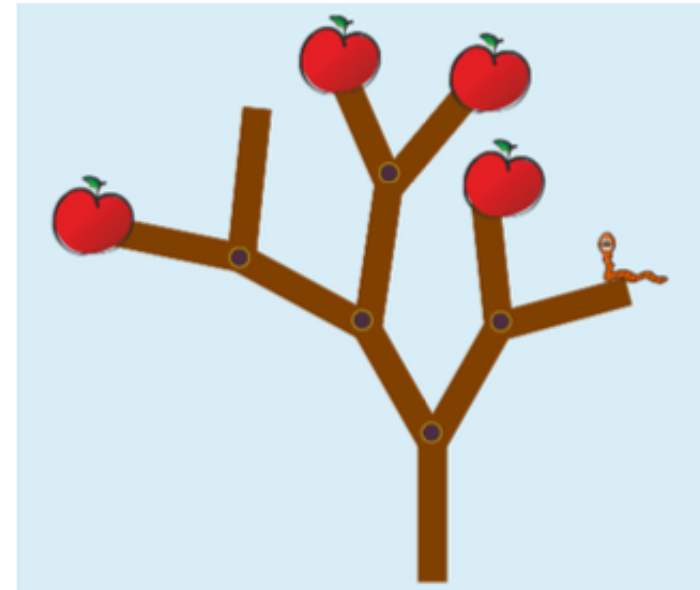
Seekor cacing sedang duduk di ujung cabang sebuah pohon apel. Ia ingin makan semua apel yang ada lewat dahan pohon. Setiap bagian dahan, panjangnya 1 meter.

Tantangan:

Berapa meter lintasan terpendek yang harus ditempuh untuk makan semua apel yang ada?

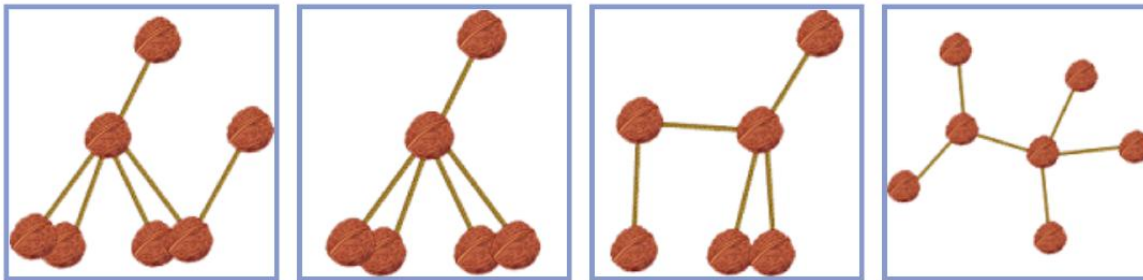
Pilihan Jawaban:

- a) 4
- b) 15
- c) 9
- d) 13

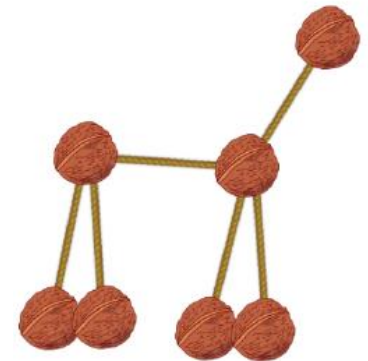


Contoh Soal SD – Abstraksi, Graf

Ucok si berang-berang mempunyai permainan dari biji kemiri diikat tali.
Dari 4 gambar berikut, maka yang dapat membentuk Anjing sebagai berikut ?



Anjing



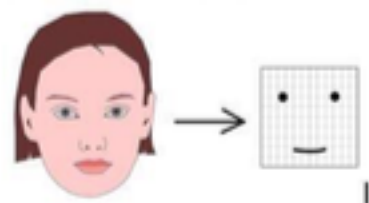


Senyum

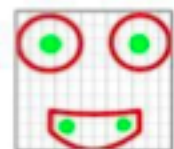
PENGGALANG (SMP)
I-2017-DE-02

Berang-berang menemukan suatu alat untuk mendeteksi wajah tersenyum dengan kamera. Alat tersebut bekerja dengan 2 langkah:

Tahap-1: transformasi foto wajah menjadi semacam "smiley" yang diberi dua titik dan garis yang menunjukkan posisi mata dan mulut.

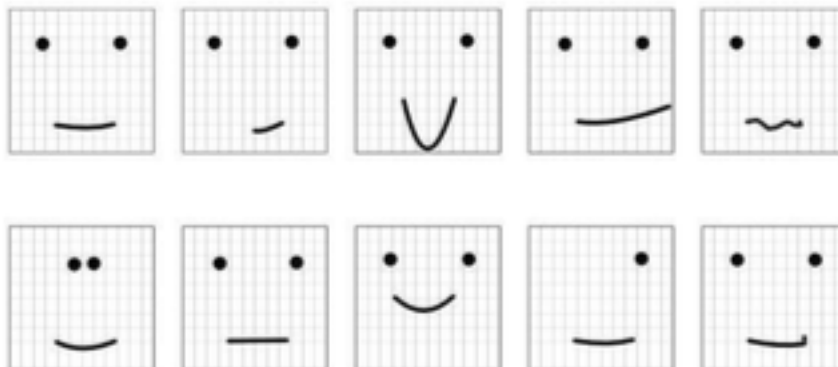


Tahap-2: deteksi apakah wajah tersenyum dengan mencocokkan gambar hasil tahap-1 dengan pola yang terdiri dari garis merah dan titik hijau. Wajah dideteksi sebagai wajah tersenyum, jika dan hanya jika gambarnya menyentuh semua titik hijau dan tidak menyentuh garis merah.



Tantangan:

Berapa gambar hasil tahap-1 sebagai berikut, yang dideteksi sebagai wajah tersenyum?



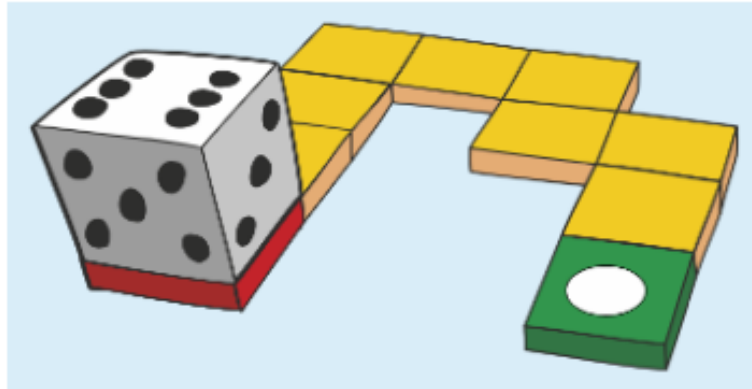
Contoh soal – state machine



Memindahkan Dadu

PENEGAK (SMA)
I-2017-MY-05

Jack si berang-berang menggulirkan sebuah dadu sepanjang jalan tanpa pengeseran. Untuk memindahkan dadu dari satu petak ke petak berikutnya, Jack memutar dadu sepanjang pinggir yang ada di perbatasan antara dua petak. Dia melakukannya 9 kali sampai dadu mencapai petak berisi bulatan putih di sebelah kanan.



Tantangan:

Sisi dadu dengan berapa titik ada di **dasar** dadu saat dadu mencapai petak hijau di ujung?

Pilihan jawaban:

- ☐ 3
- ☐ 6
- ☐ 2

Tantangan Bebras 2018



Apa itu Bebras Computational Thinking Challenge ?

Bebras Challenge adalah tantangan para siswa SD, SMP dan SMA secara online untuk mengedukasi kemampuan problem solving yang di dalamnya terkandung konsep computational thinking (informatika).

Bebras Task disajikan dalam bentuk uraian persoalan yang dilengkapi dengan gambar yang menarik agar mudah dipahami siswa.

Kategori "Siaga"
untuk siswa-siswi SD

Kategori "Penggalang"
untuk siswa-siswi SMP

Kategori "Penegak"
untuk siswa-siswi SMA

Informasi Pendaftaran dan Pelaksanaan : <http://bebras.or.id>

Untuk Latihan Bebras Challenge berbahasa Indonesia : <http://olympia.id>

NBO Bebras Indonesia : Tim Olimpiade Komputer Indonesia



Ayo berlatih dan ikut Berpartisipasi dalam Tantangan Bebras 2018 Tanggal 15 Nov 2018

Akan diadakan sesi latihan beberapa kali sebelum lomba

Segera buat akun di <http://olympia.id>

Terimakasih



<http://bebras.or.id>
Bebras Indonesia



Informatics (CS) *versus* ICT

- **Informatics (Computer Science)** is concerned with **designing** and **creating** informatics ‘products’ and ‘tools’, such as: algorithms, programs, application software, systems, methods, theorems, computers, ...
- **ICT** – applications of CS (computing) – concentrates on how to **use** and **apply** informatics and other information technology tools in working with information;
can be also creative